

TOWARDS MORE SUSTAINABLE CONSUMPTION AND PRODUCTION SYSTEMS AND SUSTAINABLE LIVELIHOODS

LEARNING CONTRIBUTIONS OF
THE REGIONAL CENTRES OF
EXPERTISE ON EDUCATION FOR
SUSTAINABLE DEVELOPMENT

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Sustainable livelihoods and consumption, as well as production, are the end-states of any activity or project that is serious in wanting to create a sustainable future. They are key building blocks that give a strong foundation for making sustainability a reality. To bring this about, it goes without saying that education for sustainable (ESD) plays a major role that would result in shifting mindsets that would be able to recreate and support a new ecosystem – mentally and physically – for this to happen.

As one of the conveners of the first seven pioneering Regional Centres of Expertise on Education for Sustainable Development (RCE) launched in Nagoya in 2005, I am indeed pleased to note that within a relatively short period of time, a dozen RCEs around the world are actively working towards the goals of sustainable livelihoods and consumption as well as production by offering groundbreaking ESD initiatives. This no doubt will go a long way in providing further encouragements for other RCEs, in particular, to emulate and learn from; and generally to reassure the wider majority – especially policy and decision-makers – that ESD is not only possible, but also that sustainability is not just a flash in the pan.

In the post-Rio+20 context, these exemplary case studies are even more relevant to higher education as envisaged by the People's Sustainability Treaty in Higher Education. They will inevitably restore greater confidence in the sustainability movement, which, more often than not, involves institutions of higher education. Indeed, in many cases, these institutions of higher education are leading the movement. It is worth noting that there are currently more than 100 RCEs the world over and this volume can inspire many more RCEs in the near future.

Notably, the lingering global downturn – fueled by the financial crisis, socio-political uprisings, rampant scandals and corruptions in high places – puts a particular challenge as efforts and commitment towards sustainability get distracted from more immediate needs (not necessarily sustainable) to keep afloat. Here again is where the examples provided in this volume would be of utmost

importance in terms of sharing experiences. They too could provide a number of counter-balances to the failure in the shortcomings of rounds of talks, be they in Copenhagen or the more recent meeting in Cancun, or even that of the just completed Rio+20 Conference.

The cases cited in this volume highlight the fact that the push for an enduring sustainability comes not from a single effort but a combination of cross-efforts from multiple stakeholders, within the RCEs, and indeed among RCEs. Generally, it is a bottom-up initiative that drives the sustainable development strategy supported by the public at large. This in turn depends on the level of awareness and advocacy that contributes to sustained initiatives.

As sustainability engagement increases, so too does the level of commitment, leading to better chances of livelihoods being sustainable and, likewise consumption and production.

Lastly, I would like to congratulate all the RCEs that are featured in this volume for their tremendous contributions, and also the editors and authors for making them available and accessible through this invaluable volume.

Fanny Demassieux

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Addressing today's global challenges, ranging from financial crises and climate change to resource shortages and poverty, requires the full participation of educated and motivated citizens. Internationally, education has been recognised as a crucial element in facilitating a shift towards sustainable development and in promoting sustainable consumption patterns through the United Nations' decision to launch the UN Decade of Education for Sustainable Development (2005-2014).

Education for sustainable development (ESD) is promoted as a process to engender a culture that is respectful to the core principles of sustainable development and is advanced as an important social process.

A core component of ESD is education for sustainable consumption (ESC), which consists of the acquisition of knowledge, attitudes and skills necessary for functioning in today's society. ESC is about responsibility learning, which aims to contribute to the individual's ability to manage their own life while also participating in the stewardship of the global society's collective life.

At the United Nations Conference on Sustainable Development held in Rio de Janeiro in June 2012 (Rio+20), green economy was recognised as one of the important tools available for achieving sustainable development. This shift towards a green economy cannot be sustainable without the active participation of educated citizens who are aware of their fundamental rights and freedoms and are appropriately informed to participate in the public debate and make responsible decisions.

Education systems – formal, informal and non-formal – must therefore ensure that citizens receive the necessary skills and training in how to define issues, gather, handle and apply relevant information, consult, plan courses of action, make responsible choices, analyse and assess the consequences of their actions, and reflect upon the effect they have made locally, nationally and in a global context. This is especially important for young people under the age of 25, who make up nearly half of the world's population, with most of them living in developing countries.

Adequate education and training allow citizens to participate actively in the labour market, by increasing their productivity and employability. Thirty-three thousand

young people are expected to enter the job market daily between now and 2050. However, although today's young people are the most educated generation ever, young people are three times more likely to be unemployed than adults.

Opportunities for young people to find a job are inevitably bound to the economic and employment situation in their respective countries. Integrating this generation into the active workforce and equipping tomorrow's leaders and workers with the necessary skills and knowledge are crucial determining factors in the success of this transition to a green economy in the context of sustainable development and poverty eradication. This is already taking place in various parts of the world through the numerous educational initiatives, including the groundbreaking ESD initiatives from Africa, Asia and the Pacific, Europe and North America that are discussed in this publication.

As these initiatives show, molding a generation that is attuned to the goals of sustainable development needs solidarity, commitment, collaboration and collective action. This, along with mainstreaming both ESD and ESC, can be achieved through multi-stakeholder partnerships such as those that are included in this publication. Governments, civil society and international organisations such as the United Nations, among others, have a key role to play in sharing those experiences, in identifying key success factors, to assess what kinds of initiatives have a significant and efficient impact on educational policies and practices. This can then enable countries and organisations to strengthen and replicate those initiatives, adapting what works for them to address their respective national priorities and challenges. To that end, the 10 Year Framework of Programmes on Sustainable Consumption and Production adopted at Rio+20, and which gives due consideration to education and lifestyles, will provide a global and more coherent context for further promoting ESD.

Editors' Note: This preface is written 'à titre personnel' and does not necessarily reflect the views of the United Nations Environment Programme.

Prof. Dr. Hans J. A. van Ginkel

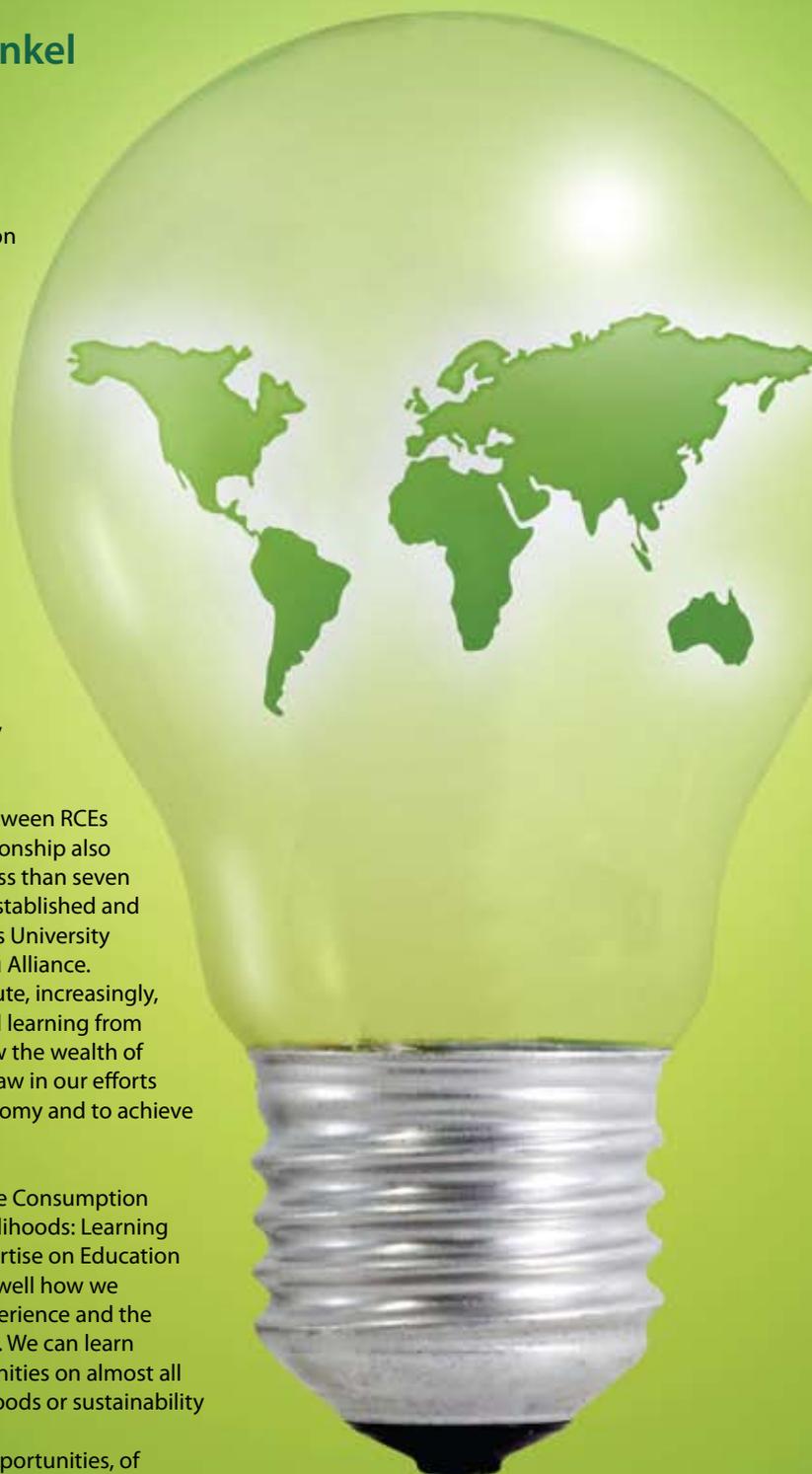
United Nations University Rector 1997-2007

The Regional Centres of Expertise on Education for Sustainable Development (RCEs) are, themselves, multi-stakeholder initiatives bringing together schools, universities, the media, museums, NGOs, businesses and public authorities. They are also perfect breeding grounds for many multi-stakeholder initiatives. Such initiatives often focus on education that can enable present and future generations to contribute to the sustainable development of the regions and communities to which they belong. Environment and development are issues that clearly differ from place to place. RCEs, therefore, do also offer many opportunities to develop place-based initiatives to promote sustainable development beyond education: to put words into action. In this way RCEs play strategic roles in their specific regions.

These few lines clarify the strong relations between RCEs and their respective regions. This strong relationship also explains the success of the RCE initiative: in less than seven years, worldwide, more than 100 RCEs were established and officially acknowledged by the United Nations University Institute of Advanced Studies and the Ubuntu Alliance. Their number and global distribution contribute, increasingly, to inspiring opportunities for comparison and learning from each other. The case studies in particular show the wealth of experience and creativity on which we can draw in our efforts to build a greener and socially more just economy and to achieve a sustainable society.

This publication on 'Towards more Sustainable Consumption and Production Systems and Sustainable Livelihoods: Learning Contributions of the Regional Centres of Expertise on Education for Sustainable Development' illustrates very well how we can all profit by learning from the diverse experience and the innovative thinking of so many different RCEs. We can learn from initiatives in big cities and small communities on almost all continents, by focusing on sustainable livelihoods or sustainability entrepreneurs.

An inspiring exploration of challenges and opportunities, of changing conditions and innovative responses.



Global map of RCEs

The ESD Programme at UNU-IAS created a global network of more than 100 Regional Centres of Expertise on Education for Sustainable Development (RCE) worldwide. The RCEs provide a framework for strategic thinking and action on sustainability by creating diverse partnerships among educators, researchers, policymakers, scientists, youth, leaders within indigenous communities and throughout the public, private and nongovernmental sectors.

Because of each RCE's diverse network of partners and their wealth of local knowledge and resources, they have the potential to transform current consumption and production systems. Globally, RCEs have launched a number of groundbreaking ESD initiatives that address some of the greatest challenges we face in moving to more sustainable consumption and production systems.

AFRICA & MIDDLE EAST

Cairo, Egypt
Ghana
Greater Mbarara, Uganda
Greater Nairobi, Kenya
Jordan
Kakamega-Western Kenya
Kano, Nigeria
Khmomas-Erongo, Namibia
Kuwa-Zulu Natal, South Africa
Lagos, Nigeria
Lesotho
Makana & Rural Eastern Cape, South Africa
Maputo, Mozambique
Mau Ecosystem Complex, Kenya
Minna, Nigeria
Senegal
Swaziland
Zomba, Malawi

THE AMERICAS

Bogota, Colombia
British Columbia (North Cascades), Canada
Chaco, Argentina
Curitiba-Parana, Brazil
Grand Rapids, USA
Greater Sudbury, Canada
Guatemala
Lima-Callao, Peru
Montreal, Canada
North Texas, USA
Rio de Janeiro, Brazil
São Paulo, Brazil
Saskatchewan, Canada
Tantramar, Canada
Toronto, Canada
Western Jalisco, Mexico

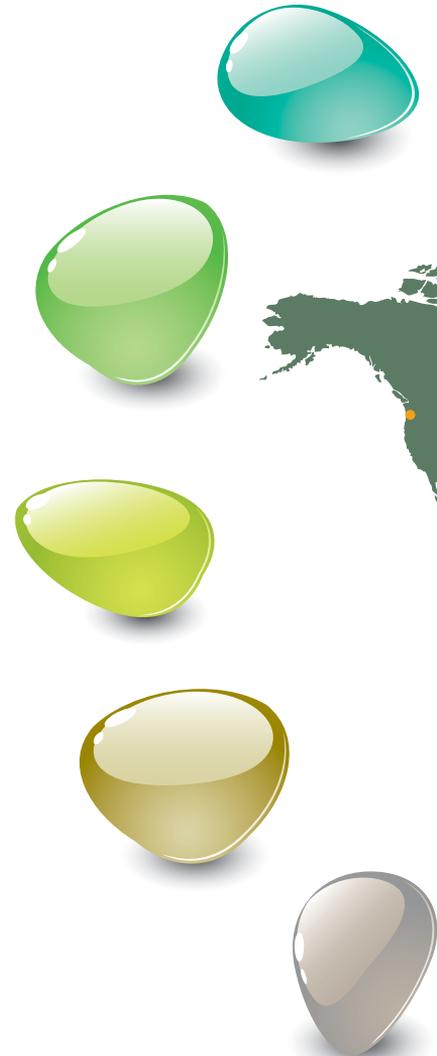
ASIA-PACIFIC

Anji, China
Arunachal Pradesh, India
Bangalore, India
Beijing, China
Bogor, Indonesia
Bohol, Philippines
Cebu, Philippines
Cha-am, Thailand
Chandigarh, India
Chubu, Japan
Delhi, India
East Kalimantan, Indonesia
Gippsland, Australia
Goa
Greater Dhaka (IUBAT), Bangladesh
Greater Phnom Penh, Cambodia
Greater Sendai, Japan
Greater Western Sydney, Australia
Guwahati, India
Hyogo-Kobe, Japan
Ilocos, Philippines
Incheon, Republic of Korea
Kitakyushu, Japan
Kodagu, India
Kyrgyzstan
Lucknow, India
Mumbai, India
Northern Mindanao, Philippines
Okayama, Japan
Pacific Island Countries
Penang, Malaysia
Pune, India
Shangri-la, China
Southern Vietnam
Srinagar, India
Tongyeong, Republic of Korea
Trang, Thailand
Ulju, Republic of Korea
Western Australia
Yogyakarta, Indonesia
Yokohama, Japan

EUROPE

Açores, Portugal
Barcelona, Spain
Central Macedonia, Greece
Creias-Oeste, Portugal
Crete, Greece
Denmark
East Midlands, UK
Espoo, Finland
Graz-Styria, Austria
Hamburg, Germany
Ireland
London, UK
Munich, Germany
Nizhny Novgorod, Russia
North East, UK
Nuremberg, Germany
Oldenburger Münsterland, Germany
Porto Metropolitan Area, Portugal
Rhine-Meuse
Samara, Russia
Severn, UK
Skåne, Sweden
Southern North Sea
Vienna, Austria
Wales, UK
Yorkshire & Humberside, UK

List of RCEs as of July 2012





Learning and Innovation for Greener and Socially Just Societies

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Learning Together for Sustainability

Shifting to a greener and more socially just economy to achieve a sustainable society requires serious changes in production and consumption systems at the local and global levels. Such changes call for development of new competencies and capabilities in all sectors of society, including the market, government, and voluntary sectors. These competencies and capabilities, while including employment, are also concerned more generally with livelihood and lifestyle and the comprehensive learning most adequately characterised as education for sustainable development (ESD). ESD requires long term and systems thinking, dealing with complexities, and working in partnerships. It also entails specific knowledge related to areas of one's personal and professional life that impact local and global communities and ecosystems.

While it is important to develop new knowledge, learning, and innovation within each economic sector and other organisational sectors, the challenge of working across sectors and disciplines has to be addressed. More sustainable consumption and production (SCP) systems require redefining the boundaries of traditional responsibilities between producers and consumers, regulators and those being regulated, and innovators and innovation users within the marketplace. At the same time, each of these market-based solutions can be significantly bolstered and some may, in fact, depend on autonomous or collaborative innovation by other sectors (including higher education, government, and non-profit organisations). This type of innovation would rely on the traditional strengths found in each of the corresponding models of production of the respective sector (in this case, scholarship within higher education, citizenship within one's country, and volunteerism within the not-for-profit sector). Such inter-organisational innovation is concretely expressed in the global development of the United Nations University's Regional Centres of Expertise (RCEs) on ESD that are enabling new forms of regional learning opportunities through the formation of grassroots, multi-sectoral regional partnerships.

In a drive towards more sustainable development, it is critically important to revisit the meaning and ultimate goals of productive relations in modern society from the perspective of quality of life and ecosystem health.

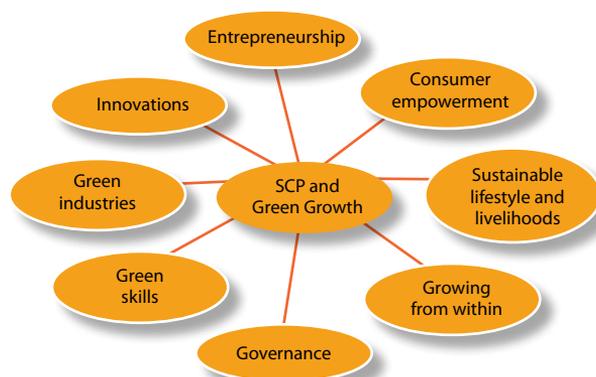
These goals are, in turn, embodied in the idea of sustainable livelihoods and well-being for all – both now and in the future.

While ESD principles and outcomes have to be instilled in all educational, training and action initiatives to inform how green growth is understood and implemented, several areas require particular attention. We explore these areas, paying specific regard to the examples of multistakeholder actions by RCEs in different parts of the world.

Critical Areas of Change: Towards a green, resilient and just society

Twenty years after the Earth Summit of 1992, governments, international organisations and other major groups came together in Rio de Janeiro, Brazil, to discuss measures to address issues of sustainable resource use, decent and meaningful work, and eradication of poverty. One of the key themes that has dominated the official discussions is how to develop a green economy that enables a dignified life for millions of poor people while charting possible development paths that are not environmentally destructive.

Elements of SCP and Green Growth Agenda



The discourse of green growth covers a variety of complex areas related to the topics of sustainable production and consumption. These include lifestyle choices, green skills through technical and vocational education and training (TVET), green industries, governance for a greener economy, and sustainable livelihoods, to name

just a few. The complexity of the issues, also reflected by multiple definitions of green economy and green growth, has produced different interpretations of the intended scope and ability of a green economy to address the current challenges of development. Often, the discourse of green growth remains too narrow, as it assumes that solutions to sustainability are focused on innovations led by the marketplace, particularly by existing large players. As a result, many critical actors remain unchanged and processes underutilised. For example, discussions of the green economy tend to under-emphasise the need for the generation of new enterprises, innovation by existing small and medium sized companies, and development by alternative market organisations (such as cooperatives and credit unions). They tend to overlook consideration of market strategies that favor the competitiveness of the poor and the most vulnerable and those without access to resources. Most importantly, a dominant focus on market processes leaves aside the need for non-market strategies – critical especially in cases of market failure – including those led by various levels of government and other non-market players. As a result, many alternative development approaches, such as endogenous development, remain on the fringes – even when holding critical potential for greener, more just and resilient societies.

We consider the concept of green growth more critically. Rather than seeing it as a general view that all market growth is good when it meets minimal environmental standards (with social aspirations assumed to be addressed merely through such growth), we examine and evaluate green growth in the broader context of sustainable development, focusing on the forms of economic growth that are most conducive to sustainable development's overarching goals. Generally, a green economy cannot be seen as simply a market with greener products replacing less environmentally friendly alternatives; rather it is an emergent challenge to advance diverse local development that leads to improved resilience of markets and equitable societies as a whole, with ongoing improvements in quality of life in times of substantial global change.

This chapter demonstrates the role of learning for sustainable development, based on the principles of ESD, in transitioning towards a greener and sustainable society. While focusing on ideas and actions within traditional market discourse, we also consider the need to

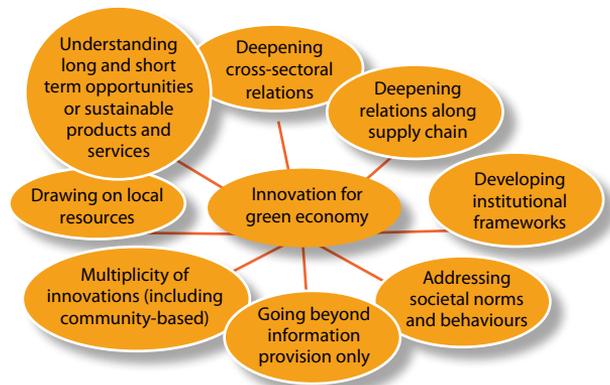
engage solutions involving those traditionally excluded from productive activities, those who could, if provided with necessary assets and capabilities, develop more sustainable livelihood practices for themselves and their broader community.

We begin by bringing to the fore various challenges of transitioning towards a green economy and by discussing how ESD is able to support working with these challenges. We will assist development of an appreciation of the potential of learning for sustainability enhanced by reference to practical examples developed by RCEs in various regions of the world and the positive outcomes of regional and global networking of these RCEs through a multilateral platform.

Innovations for the Green Economy: including local and global

Market prices of goods and services, in the majority of cases, do not reflect environmental and social externalities that occur along their life cycle. While information on the negative and positive effects given to various stakeholders is important, for example, to individual consumers and those engaged in organisational purchasing, more

Critical areas for stimulating innovations for the Green Economy



fundamental changes in societal norms and behaviors as well as developing new relations along production value chains are required. Understanding challenges of modern production-consumption systems needs to be combined with the ability to recognise opportunities for

innovation, often spanning across traditional sectoral and geographic boundaries dividing economic and social players (including consumers and producers). Finally, and fundamentally, the ability to create and sustain an institutional framework that is conducive for transition to a sustainably developed society requires continuous learning and innovation.

What consumption and production systems would look like within a green economy is not yet clearly understood. Nor can they be conceptualised universally for different regions. Understanding the need for particular and customised patterns of development and growth (involving market and non-market forms of production and investments in each type) will require enormous collective innovation and learning. Production-consumption systems need to emerge from the multiplicity of change practices initiated by communities on the basis of immediately available resources within communities. This is reflected in actions taken by RCEs.

RCE Makana and Rural Eastern Cape in South Africa (Box 1) supports a Saturday market to strengthen local production and consumption while RCE Lucknow in India assists in the development of productive forest resource-based livelihood activities by the Tharu indigenous communities. Both initiatives contribute to small scale low or no cost innovations that have triggered new production-consumption relations leading to local sustainable development. Education has a special role to play in sustaining such processes. By involving situated learning drawing on the knowledge, history, and resources of the communities involved, people and organisations have been empowered to look beyond those possibilities immediately given by existing market systems of consumption and production. Governance of such innovative market processes, akin to governance innovations provided by RCEs themselves, secures continuity of learning processes and synergies with other developments, including existing forms, in each region.

Box 1. RCEs' innovative practices for greener economy

RCE Makana and Rural Eastern Cape (South Africa)

Through encouraging collaborative initiatives among its partners, RCE Makana and Rural Eastern Cape contribute to the development of a range of change-practice approaches that set out to explore what could be done to improve quality of life with resources available in the region's communities.

The projects, ranging from initiation of a bicycle-based small business for cleaning and composting to support for local Saturday markets, are being developed on the assumption that change for more SCP practices has to come from direct engagement of people in change practices (changing to learn) rather than from a simple reliance on awareness and knowledge transfer expected to trigger actions (learning to change). Small scale projects of the RCE, oriented to a "no or low cost" way of doing things, have led to a variety of innovations, in turn, triggering new activities. These have led not only to livelihood improvements for the poor but also have demonstrated their ability to contribute to low carbon and low pollution practices, along with rejuvenation of traditional knowledge and improvement of quality of life.

RCE Lucknow (India)

Collaboration of governmental departments, academic institutions, NGOs and schools through RCE Lucknow enabled critical engagement with the Tharu tribes of the Dudhwa region in relation to the natural resource management (NRM) plan for the area.

The lands traditionally used by the Tharu indigenous community were designated as a national park in 1977. This led to the change in resource-use patterns of the community and, eventually, to conflicts with the authorities. The main objective of the NRM project was to establish a balance in development through introducing livelihood activities for the Tharu people that, at the same time, lead to preservation of biodiversity. Multiple planning meetings engaging the community and professionals (in agricultural and livestock practices, conservation, market and handicraft development, energy efficiency and education) led to mapping of local resource flows as well as identification of activities for socioeconomic uplifting of the communities. Learning about interdependencies of the natural and human systems, understanding

entrepreneurship opportunities, and developing skills for food, energy and craft production were the foci of the project. Capacity development has been designed with consideration of appropriate learning pedagogies centred on realities of the indigenous community and aiming at improving their quality of life. Participation of the local community, especially women and children, has contributed to a quicker uptake of these practices and a greater sense of community ownership.

Entrepreneurship for Sustainable Development

Entrepreneurship has been acknowledged as a major contributor to production of sustainable products and services as well as innovative processes. It is also a strategy for providing livelihood opportunities for many regions, in both developing and developed countries, that experience economic and social hardship.

Critical areas for Entrepreneurship for Sustainable Development



The critical role of entrepreneurship in a green economy and socially just society is attributed to entrepreneurs, often through small and medium sized companies, demonstrating significant flexibility in addressing emerging issues with a high degree of innovation. Education of entrepreneurs that work with sustainability problems (for example, vulnerability and poverty, social inequality, and environmental degradation) could itself become a “launch pad” for new business development. Such education is required to enable individuals, communities, and organisations to produce viable alternatives to existing production-consumption systems that fail to adequately address issues of improving

quality of life for all over the long term and/or cause environmental deteriorations along the supply chain. They also need to facilitate development of competencies that lead to exploiting such identified business opportunities by creating new enterprises or altering existing enterprises. Entrepreneurial education and support is needed to help identify business opportunities for producing improved or new products, processes, and services as well as securing conditions for new systems of production and consumption supplemented by or through synergies with other sectors (such as government, faith organisations, the non-profit sector and policy and programmatic change in these respective organisations). For example, entrepreneurship practices of RCE Delhi (Box 2) have focused on the development of livelihood opportunities for women in resource poor urban communities. Considerable effort of the RCE’s partners and the communities it represents were spent on identification of for-profit market opportunities built on a strategy of initially identifying resources (from waste materials) and potential markets for products made from these (for example, handicrafts, bags, etc). In addition, skills needed for their production and distribution were also identified. The success of the project is a result of collective efforts of organisations enabling strategic analysis of the entrepreneurial opportunities (by higher education institutions), learning of new capabilities (by NGOs) and creation of appropriate institutional conditions (by governmental departments). Efforts of RCE Vienna (Box 2) in empowering sustainability entrepreneurs is grounded in the collective learning process leading, among other outcomes, to discoveries of additional entrepreneurial opportunities. The critical element of the project is enabling innovations that are conceived within the walls of academia to enter markets while influencing sustainable development of this cross-border region.

Box 2. Development of sustainable entrepreneurship by the RCEs

RCE Delhi (India)

RCE Delhi operates in an urban area faced with a number of problems related to poverty, inadequate infrastructure, pollution and waste, to name just a few. Empowerment of women in poor communities by increasing their livelihood choices is seen as a necessity and an opportunity by partners of the RCE.

Continued on the next page

Project CARE (Creating Awareness, Skills and Responsibilities towards the Environment) seeks to engage college students and young professionals from Accenture in skills development for low income urban communities in environmentally vulnerable locations. Through participatory actions, the project identified waste materials that could be immediately made available for conversion into potential products such as handicrafts and paper bags. Engagement of various partners (including researchers assisting in understanding profiles of these communities, NGOs facilitating identification of the necessary skills and leading processes for their development, and youth working on continuation of the process) lead to opportunities for low income women to become innovative entrepreneurs.

RCE Vienna

RCE Vienna works in the densely populated region located between two European capitals – Vienna and Bratislava. The flagship project of the RCE aims at development of regional entrepreneurs that perform sustainable business activities through creation, renewal or improvement of products, services, technologies, or organisational processes. Such business actions are expected to accentuate long lasting positive impacts on social, ecological, communal and cultural aspects for regional sustainability. The first phase of the project strives to identify sustainability entrepreneurs, understand critical factors that impact their actions and design processes that lead to support and upscaling of sustainable entrepreneurship in the region. The partners who represent academia, private sector and civil society organisations are particularly focused on translating knowledge of academia into innovative sustainable production processes.

Greener skills and more sustainable Technical and Vocational Education and Training

The formal education system (including elementary, secondary, and post-secondary education) and technical and vocational education and training (TVET) systems have to reflect the needs of restructuring the economy towards greener and more socially just societies. Transitions would lead to structural changes in the industrial sectors through trained professionals. This would include diminishing the number of so-called “brown” industries characterised by their high degree of pollution. This requires greening of existing industrial processes to enable the emergence of new, sustainable industrial systems. Greening of TVET is also seen as a strategy to bring more dignity to the jobs available in a variety of productive sectors due to the socially laudable goals associated with sustainability and a greater acknowledgement and legitimacy for TVET. At the same time, a focus on the social and ecological goals of sustainability often affirms the underlying ethical or normative goals of technical and vocational training and other forms of professional training. These ethical goals linked to particular occupations, for example, are reflected in the nursing profession and its goal of health or the engineering profession and its goal to efficiently and effectively use materials in achieving useful outputs. These projected changes require development of each educational sector in collaboration with other educators with the aim of the emergence of TVET and tertiary programmes that are aligned with sustainability outcomes.

Critical areas for Green Skills Development



In order to develop TVET that provides education for millions of workers able to bring sustainability skills into existing and emerging work places, there is a need to integrate local, regional, national, and global sustainability issues related to specific occupational specialisations. Such issues would need to be discussed by major stakeholders including communities and potential employers. The educational processes of TVET have to consider developing local, place-based learning opportunities exposing technical and vocational trainees to local ecosystems and community needs. Such place-based education, as well as future employment success, to a large extent, depend on the development of skills that go beyond technical competencies and includes an understanding of complexities, problem solving, and ability to work with various sectors and stakeholders across the supply chain. Among critical issues that TVET has to be facing today is a question of challenges that graduates of the TVET system might face if employed in various world regions. Professional outmigration, strong in such professions as nursing, engineering, or construction, requires understanding of not only a broad range of development challenges but impacts of the international movement of such professionals.

While agreement on the right competencies and approaches for their development are important, the critical issue becomes developing competencies for educators and trainers of TVET. In addition to the specific programmes oriented to TVET educators, their learning could also be facilitated by closer collaboration between TVET and technology development sectors (including other higher education organisations and community innovators), governments (providing coordination of educational and development strategies) and industries (providing opportunities for employment and investment into new sectors). Transition to the green economy would also benefit from the TVET sector enabling development of sustainability competencies and access to the market for traditionally disadvantaged groups and those needing assistance. As sustainability challenges are of an evolving nature, such education would need to be seen as a continuous process.

An example of the development of sustainable TVET practices in conjunction with other educational and local partners is found in the Riverfarm project of

RCE Greater Western Sydney in Australia (Box 3). This multistakeholder project developed around the idea of revitalising the Hawkesbury Riverfarm which, in turn, led to the development of new types of learning for a variety of learners (ranging from the primary and secondary level to post-secondary education and other higher education partners). Among them were the students of the Western Sydney Institute of Technical & Further Education (TAFE WSI). These pre-apprentice carpentry, electrical and plumbing students, under the supervision of their teachers, engaged in community-based learning to gain key development skills leading to the rejuvenation and renovation of the historic Riverfarm site. The action education and research takes place in synergy with other projects undertaken by The New South Wales Department of Education and Communities, the Brewongle Environmental Education Centre, the Hawkesbury Nepean Catchment Management Authority, the Darug Custodian Aboriginal Corporation, and the Hawkesbury Alumni Charter. These activities aim at understanding and supporting historic, cultural and natural characteristics of the farm site and development of new learning strategies for regional sustainable development. Ultimately, they address new ways of professional education fitting into an agenda of green growth and sustainable market and non-market practices. The project has notably been recognised by The Skills for Sustainability – Educational Institution Award.

The three-year BauNachhaltig project of RCE Hamburg (Box 3) also focuses on a transformation of TVET. In particular it addresses the need to simultaneously develop skills and systems for the more sustainable low-carbon construction sector in Germany. At the core of the project is an initiative of the nine KOMZET competence centres for professional training in building and energy. A key goal is to develop TVET learning materials based on sustainability principles in relation to housing. The project demonstrated the critical importance of partnerships in learning and innovation toward more sustainable building practices. With a focus on particular construction elements within a complex unified project, along with individual craftspeople coming together, awareness raising concerning the overall system effects of individual decisions took place. In this way, quality becomes defined from a sustainability perspective and embedded in practice. Interestingly, learning is required not only among the professionals

developing the buildings but, in the case of complex projects such as passive houses, the users who eventually own the houses. With the ambitious goal of substantially contributing to low carbon development, the project has identified a need to go beyond the field of technical and vocational education to engage other businesses within the building sector along with planners, investors and private individuals.

Box 3. Work of RCEs in the area of sustainable TVET

RCE Greater Western Sydney (Australia)

The Hawkesbury Riverfarm in Australia is a flagship project of RCE Greater Western Sydney and a living laboratory for learning and action-research being developed on Sydney’s Hawkesbury River. The University of Western Sydney Hawkesbury Riverfarm Education Centre is transforming this culturally historic site into a unique real-world learning and research resource linking land, food, culture and water. Partners of RCE Greater Western Sydney focus on the development of student skills for ecosystem appraisal as well as advancing capabilities and green skills identified in their respective national vocational education and training packages. The project is an innovative example of how institutions of primary and secondary, post-secondary and higher education can work in a coordinated way to support the implementation of the new national curriculum in the area and foster learning pathways towards greener economy and sustainable learning.

RCE Hamburg (Germany)

Among the challenges addressed by the partners of RCE Hamburg is a need for education and training that leads to the adoption of low-carbon technologies. While this is a challenge for many sectors, energy efficiency in construction and building – both for newly developed buildings as well as those going through retrofitting – is critical. Recognising technical and vocational training as a key for addressing this challenge, nine competence centres for professional training in building and energy within the nationwide KOMZET network have joined together as part of the three-year BauNachhaltig (‘BuildSustainable’) project. The project is based on the premise that high quality construction is a prerequisite for sustainability and vice-versa. It focuses on the development of learning

materials and pedagogies that contribute to various professions and other sectors involved in sustainable construction. The project is supported by the faculty of Applied Building Technology at the Hamburg University of Technology, the Federal Institute for Vocational Training (Bundesinstitut für Berufsbildung (BIBB)) and the Federal Ministry for Education and Research (Bundesministeriums für Bildung und Forschung (BMBF)). It is closely informed by the experiences of small and medium sized enterprises (SMEs) in the construction sector who remain critical project partners.

Green Industries

The previous discussion can help lead to a re-envisioning of what green industries might need to look like for the 21st century and how learning and education can promote transitioning to more sustainable modes of SCP. For example, from a structural perspective, it highlights elements of how green industries that support SCP – and, more generally, the concept and identity of sustainable lifestyles and livelihoods – are going to need to be (re-) structured. This is especially the case, if, as it has been argued, these are important elements or preconditions for viable and successful green industries. Educationally, it points out how new forms of learning and scholarship for sustainability associated with inter-sectoral, collaborative partnerships at regional levels (exemplified by RCEs), new technical sustainability education for TVET, and broad consumer and public education for sustainable development can affect internal education and training systems of industries.

Critical areas for Development of Green Industries





From an institutional perspective, considerable production innovations along with innovations in administrative norms and practices may need to take place. An evolutionary or gradual approach can focus on internal measures that optimize existing systems. These might include cleaner forms of production and more sustainable product and service design reflecting, in turn, underlying principles of systems thinking that enable the long-term functionality of products. It may also be that additional dynamic institutional changes within industries need to take place that allow industries to fully take advantage of new social capacities and expectations emerging in societies committed to sustainable development. Such transformative market features could be analogous to the institutional transformations (and benefits) associated with the historic democratisation of governments and the broad citizen education that accompanied these changes. These institutional innovations seem to be already occurring to some extent, for example, in the area of corporate social responsibility (CSR) that envisions a broader stakeholder and citizen accountability beyond traditional investor profit maximisation and shareholder supremacy. The emergence of alternative market forms take advantage of changes in market preferences tied to sustainable development outcomes (creating new opportunities for the self-employed along with the formation of SMEs and cooperatives).

Regardless of the magnitude and scope of industrial change needed for green industries, the following components are likely necessary. At one level is a basic contextual knowledge and understanding of environmental and social trends and their drivers and impacts. In addition is a need for knowledge and experience with new technologies broadly understood. This can include new types of tools and equipment along with new instruments for evaluation, such as Life Cycle Assessment. There is, furthermore, a need to be able to integrate capacities, across disciplines and other dimensions, to be able to respond to opportunities that arise that might not have been predicted but are market opportunities nonetheless. This requires the ability to have some spare capacity and flexibility along with positive relationships internally and externally with other organisations to be responsive while reducing adverse risks. If there is a concern with every individual having a

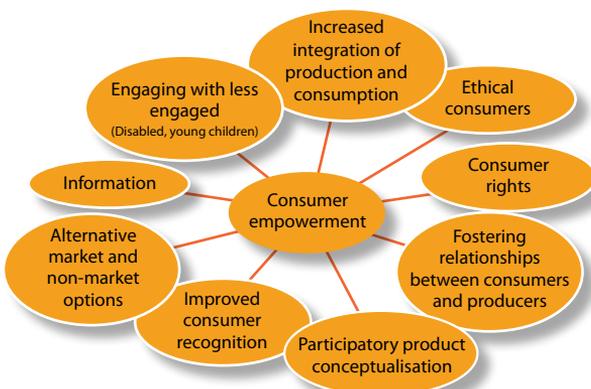
sustainable livelihood (part of which is fulfilled through market participation) one needs to also develop market conditions that encourage market entry by new players, particularly those typically left out of the market, along with the possibilities for their competitive success and viability over the long-term. In terms of addressing poverty and vulnerability, there is a need to encourage SMEs and different forms of community enterprise (such as cooperatives) given the current role and extent of markets in meeting people's needs and aspirations.

This is additionally important given the increasingly constrained levels of social support provided by state governments in many countries. One needs to systematically explore the competitive advantages of these enterprises in the context of specific social and ecosystem settings and the possible educational and community investments needed to advance such enterprises. At one level, there is a need to "optimise" current SMEs' practices making them greener, safer, and rewarding places to work. Given the limited resources of SMEs and the importance of human and social capital in small firms, there is an important role for partnerships and strategic engagement with SMEs by other organisational partners using inclusive forms of participation. These forms of participation may, in turn, not only allow for improvements in the quality of products and services provided by SMEs but also a way of developing various forms of social capital and shared physical capital and technologies that improve new and existing SME competitiveness.

Consumer Education

To consume sustainably, citizens and organisations have to be empowered to act upon information on the environmental and the social impacts of products and services they consume. These impacts include the distribution of economic and other benefits from those supplying the product or service. Actions would range from giving preference to more sustainable product and service options in meeting a particular need or preference, to engaging in and developing alternative means of addressing these needs (whether market or non-market) if these are optimal, not only in avoiding social and environmental damage but also promoting well-being and human and ecosystem resilience. It is also evident that a clear division of the role of consumers to consume and producers to produce would have to be questioned as consumers themselves become increasingly recognised as part of the performance of products and services. Smart housing or transportation systems depend on the actions of the users who, quite naturally, need to be engaged at the earliest possible stages of product conceptualisation. Such increased integration of production and consumption requires not only new understandings of the principles of system operations but increasingly fostering relationships (accompanied by shared commitments) between consumers and producers in product innovation, testing and use. Learning will also be required in other sectors, for example, to encourage consumers as citizens to join political processes that champion their rights

Critical areas for Consumer Empowerment



as consumers, to help eliminate corruption and anti-competitive practices, and to promote regulation and purchasing policies that ensure a higher ecological and production standard while not creating barriers to SMEs and marginalised groups.

Box 4. Engagement of RCEs in consumer education

RCE Skåne (Sweden)

Sustainable food systems is a flagship project of RCE Skåne. The region is famous, among other qualities, for its agricultural production. Having in mind these characteristics, the schools of Malmö (the largest city of the region) decided to help re-shape the regional food systems giving priority to organic while local producers. Targeted at communities in the Malmö municipality the project focuses on increasing organic food in school meals. Malmö, being a certified municipality as a fair-trade city, facilitates multilevel actions and programmes. In this programme a new supply chain is created by building links between organic farmers and schools. A community learning is initiated in the process through workshops, teachers training on food and SCP perspectives linked to local, regional as well as global dimensions. Regional ESD initiatives offered a suitable strategy for reorienting consumption-production systems that are contextually situated. The ambitious goal of eventually reaching 100% organic school meals, required collaboration of schools, universities, the municipality and families of school children. A combination of research, publications, education, network building supports this ongoing transition.

RCE Kitakyushu (Japan)

Activities of RCE Kitakyushu, located in western Japan, are characterised by a broad outreach to the community based on a history of citizen activism. The project aims at enabling young consumers (in particular young children and children with disabilities) to understand food and potentially make responsible purchasing decisions in the future. This project came from the experience of a housewife who found that food at a grocery store came from countries she had never visited. The group of RCE partners representing universities, schools and citizen groups has begun to work on food with special attention to the promotion of local consumption of local products and the concept

of food mileage to reduce CO2 emissions. In the course of two years of innovating, workshops at schools, university classes, community centres and nursery schools as well as testing suggested approaches, the RCE has developed a package of materials and strategies consisting of a simulation game centred on a hamburger shop, along with a puppet show, and excursions to food growing farms. While the work aimed at including children with disabilities to be able to live their own lives as members of society by sharing their experiences and creating empathy, it has also influenced developers from various sectors as well as the children's families and schools.

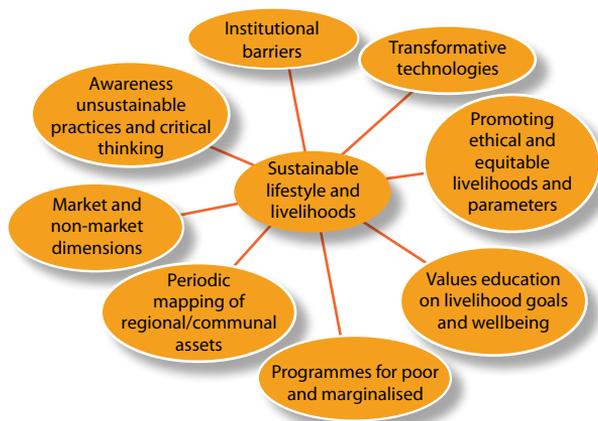
To become an active, sustainability-conscious consumer, one has to know not only the impact of products and services along their respective supply chain, but also have an ability to engage in actions and practices that lead to minimisation of environmental impacts and maximisation of sustainable livelihood opportunities locally and globally. As an example, RCE Tongyeong in South Korea and its partners aimed at minimisation of food waste thereby challenging the level of waste traditionally accepted by Korean people. They approached the issue at a system level working with schools as well as other partners, providing both conceptual and practical support. A further example comes from Sweden. Recognising the power of the public sector to create a pull towards sustainable consumption, RCE Skåne (Box 4) facilitated a project that aims at development of a new regional organic food supply chain. Their ambitious goal to provide 100% organic meals in schools led to the development of knowledge transfer and actions by multiple RCE partners. This included school children, their parents, teachers, universities and municipalities. Learning materials, research, awareness campaigns, and supply chain innovations led to a significant increase in organic food consumption at the regional schools. Mainstreaming sustainable consumption requires engagement with those that traditionally may not have been learning about opportunities and challenges associated with the topic of sustainable consumption. A further example of engaging on this topic involves disabled youth and very young children. RCE Kitakyushu in Japan is working in a region designated in 2011 by the Organisation for Economic Co-operation and Development (OECD) as a green growth model city.

The partners have developed educational materials based around the topic of sustainable food and include excursions to farms, simulation games, and theatre by focusing on the production of hamburgers. The pedagogy enables participants to think of food-related issues such as health, transportation, economic impact, and well-being based on real-life local experiences as compared to a more conventional educational model.

Promotion and Development of Sustainable Lifestyles and Livelihoods

Connected but not limited to the issue of consumer education are sustainable lifestyles and livelihoods. The idea of a livelihood goes beyond specific market choices by individuals and households for particular products and services. Livelihood also includes participating in productive and other social activities outside of the market. It also requires understanding that well-being can be undermined by overconsumption by those who are economically wealthy while addressing under-consumption by those lacking the financial means to purchase or lacking local market options for valued goods and services. Related to one's ability to purchase is one's ability to earn market income (whether through employment, self-employment, or strategic investments) that build one's asset base – broadly understood. This can include various forms of capital: physical/human-made capital, financial, social, human, and natural capital. A livelihood also includes knowledge of how one can strategically use one's individual and collective assets in non-market ways to achieve livelihood goals valued by the individual. The ability to manage risk by reducing one's own vulnerability (the exposure of one's assets to various hazards) is central to sustaining one's livelihood and should be pursued in a way that does minimal or no harm and preferably strengthens the livelihoods of others. Products and services can also be purchased that help reduce vulnerability. Education is critical that encourages livelihood strategies and use of materials advancing sustainable lifestyles and livelihoods over the long term as well as larger scale project and process interventions (such as market engagement of producers and consumers) that simultaneously advance related livelihoods within a community.

Critical Areas for Sustainable Lifestyle and Livelihoods



In developing learning and innovation systems conducive for this issue, awareness by individuals of diverse market and non-market livelihood strategies along with identification of one's personal and community asset base that can be mobilised to advance these strategies is key. Normally, a critical skill-set is needed for the periodic mapping of regional/communal assets and productive possibilities in relation to existing and emerging livelihood opportunities in one's community (and in relation to other communities and markets). Such learning is reflected in a strategy of RCE Lucknow in India. This RCE is in the process of developing livelihood opportunities for indigenous communities in the Dudhwa region. Identification of community assets enabling the production of food, energy and crafts, has been done in collaboration with organisations knowledgeable in the areas of conservation, lifestyle practices, energy, and markets. A further RCE strategy has been to systematically identify sustainability issues impacting livelihoods in a region and collaboratively develop supporting educational materials with other RCEs. RCE Cairo, for example, has worked with several RCEs in Europe to develop school kits focusing on themes impacting livelihoods in Egypt including sustainable and unsustainable behaviours, agriculture, biodiversity, energy, and water (Box 5). RCE Graz-Styria (Box 5) demonstrated another advantage of the RCEs to tap into the knowledge resources of the region. Utilising presence of several universities in the area, it brought together capacity of researchers and the students in developing more sustainable services in the area.

Education is also needed regarding institutional barriers to sustainable livelihood practices (such as corruption, or policies, regulations, and programmes preventing or undermining the implementation of new sustainability technologies or livelihood strategies favoured by the poor and vulnerable). One also has to educate on how to strategically eliminate these barriers. In addition, individuals and communities need education about unsustainable livelihood practices that create adverse risks and harm to others. More positively, education for sustainable livelihoods includes the following:

- Education regarding specific transformative technologies whose implementation can create market and non-market livelihood opportunities – especially for those who are worst off.
- Education that promotes critical thinking so individuals can identify and assess the relative merits of various livelihood strategies in achieving their livelihood goals.
- Values education to enable individuals to understand various livelihood goals in the context of individual and community well-being broadly understood.
- Values education regarding ethical parameters that shape one's choice of livelihood strategies (for example, those strategies promoting the dignity of others – both now and in the future), valuing overall equity between livelihoods, and ethical values encouraging respect for habitats and ecosystems.

One RCE strategy aiming to advance the range of livelihood options open to individuals by sharing and re-valuing equipment within communities in its region is demonstrated by RCE Saskatchewan in Canada (Box 5). The Sharing Productive Capital Project is an applied research project led by the RCE with the support of Luther College at the University of Regina, the University's Department of Computer Science, and the Craik Sustainable Learning Project. People and organisations in the region are seeking to volunteer productive capital, such as machines, tools and buildings, while software is being proposed to keep track of the available assets. Participants in the project learn about their place in systems of consumption and production by advancing local production opportunities while treating equipment shared in the community with higher standards of care, where equipment is treated as having its own dignity and being worthy of respect (akin to a citizen). While

RCE Saskatchewan is focusing on educational strategies centred on specific types of equipment, RCE Rhine-Meuse is developing critical learning processes around key themes identified in the region (such as food, water, and building) that allow real world, open collaboration among a diverse set of organisations (Box 5). RCE Cebu in the Philippines is also developing new productive activities for the community tied to ecosystem services provided by the only remaining forest on the island. The forest, which faced extinction owing to slash and burn practices, was studied by researchers at the University of Cebu and members of the local community, who identified ecosystem services capable of providing alternative employment related to tourism and education. All of these livelihood activities required learning about and within the local ecological context. Whereas economic incentives are significant in communities for shifting from unsustainable practices, such interventions have to be conscious of the local needs and appropriateness of development options. As in the case of RCE Greater Phnom Penh (Box 5), they have adopted ericulture (silk farming) as one of the economic incentive options to shift from unsustainable, high input farming to organic farming while maintaining the same pattern of land use and being aware of food security issues. Additional examples of RCEs supporting sustainable livelihoods are found in RCE London and RCE KwaZulu Natal (Box 5).

Box 5. RCEs promoting and developing sustainable livelihoods

RCE Cairo (Egypt)

RCE Cairo has demonstrated how to mobilise the strengths of the global RCE consortium to address local needs in developing education in SCP. The partners of RCE Cairo analysed national needs and capabilities to meet ESD and SD challenges as well as applying innovative pedagogical solutions developed by and with other RCEs to Egyptian livelihood realities. The outcomes of the project, that include a range of innovations from developing materials and pedagogies to designing programmes for the education of teachers in countries where other partner-RCEs operate, demonstrate the opportunities for mobilisation of global and local expertise and effective capacity development practices for SCP.

RCE Graz-Styria (Austria)

RCE Graz-Styria works in a region characterised by old industrial areas, mining and rural areas affected by migration and unemployment, alongside regions prospering from the automotive industry, tourism and the effects of central urban areas like the city of Graz. Four universities (who are some of the major employers in the area) were concerned with the relative lack of sustainability actions in the region. In response, initiatives were developed among their own staff and students under the “Sustainability4U” process. Through various activities, the University of Graz, the University of Technology Graz, the Medical University Graz, and the University of Music and Performing Arts Graz (who, together, have a 40,000-strong student population), hope to engage students and the community in actions leading to better livelihood opportunities in the region and beyond. Several projects have been developed including “UniMobil_4U” aiming to improve bicycle routes and paths between the four universities as well as a project integrating theoretical learning for sustainability (delivered through, for example, a lecture series open to all universities) has yielded practical actions contributing to sustainability.

RCE Saskatchewan (Canada)

Partners of RCE Saskatchewan are developing two initiatives that will help address sustainable development in Saskatchewan through innovative uses of equipment that support sustainable livelihoods. The first project, under the direction of the University of Regina, has involved intra and inter-organisational planning to install a vertical axis wind turbine (VAWT) on the University of Regina Campus for both energy generation and educational purposes. The VAWT has now been installed and the University is near completion of a web-based “dashboard” to share data from the VAWT for use in diverse educational settings. The second initiative is a collaboration of higher education partners of RCE Saskatchewan (including Luther College, the University of Regina, and the University of Saskatchewan) with the town of Craik to enable sharing of productive capital (such as machines, vehicles, and buildings) within the Craik community. To date, this project has involved identification of specific types of equipment to be shared, Free/Open Source Software programmes potentially available for

enabling this sharing, and specification of software features to enable equipment to “volunteer” for projects. Underlying this concept of volunteerism is a reconceptualisation of “equipment as citizen” with this new ethical valuation to be supported by the software. In both the wind turbine project and the sharing productive capital project, educational strategies are being developed centred on the pieces of equipment themselves while presupposing diverse educational audiences.

RCE Greater Phnom Penh (Cambodia)

Partners of the RCE Greater Phnom Penh are engaged in ESD projects to enhance education on food and agriculture for local schools and to facilitate improvement of agricultural practices leading to a reduction of chemical use by farmers. Agriculture and food production are the foundation of livelihoods for the majority of the Cambodian people. The RCE aspires to create models of practice-linked education that promote appreciation of organic agriculture and create opportunities for productive activities within schools and on farms.

RCE London (United Kingdom)

RCE London presents a compelling story of facilitating the formation of a network to assist shaping the legacy of the Olympic Park in East London. The development aspires to connect the Park and the communities around it. Being a network of networks, RCE London provides access to the resources – skills, expertise and power – that would assist in identification and realisation of the projects that would mitigate community disconnect from the development and to contribute to regeneration of the area. Working within a dynamic area of formal and informal education, the RCE enables people’s participation in shaping their urban environment in response to London’s hosting the summer Olympics.

RCE KwaZulu Natal (South Africa)

The uMngeni river, the main source of water in KwaZulu-Natal, is heavily polluted by storm water, toxins from industries, sewage and excess nutrients from agriculture. Despite negative quality tests and complaints from the public, little had been achieved over the years. RCE KwaZulu-Natal initiated a project where a different strategy for water monitoring was

established based on community participation and learning. Local communities have become engaged in regular water sample collection, analysis, and documentation of water quality leading not only to a greater understanding of the issues but building relations with the Howick Waste Water Treatment Works (WWTW) – a primary organisation dealing with waste water in the region. While the problem is far from being solved, public activism generated by the project has led to creating a foundation for further progress and learning.

RCE Rhine-Meuse (northern continental Europe)

The OPEDUCA (Open Educational Regions) concept of RCE Rhine-Meuse offers encouragement and opportunities for all people – from pre-school to higher education and other organisational settings – to work in close contact with each other. Instead of relying on fixed curricula and textbooks, pupils, teachers, scientists and representatives of other organisations shape learning processes around themes relevant for the present and the future. The critical learning processes that focus on the issues of food, water, building, transport and energy prompt development of regional networks of schools, knowledge institutes, companies and local governments, training of teachers, empowering schools as focal knowledge points in their own open educational region and guiding and informing experts, managers and politicians in taking part in OPEDUCA.

Governance for a Green and Sustainably Developed Economy

Redefining Boundaries and Perspectives

Sustainable consumption and production (SCP) systems as an engine of the green economy emphasise the need to deal simultaneously with both production and consumption in relation to overarching sustainability outcomes tied to human well-being and ecosystem health. The challenge remains as to how to develop sustainability habits – a culture of sustainability – across the value chains of products and services and, ultimately, across society. Currently, many SCP actions are assigned predominantly to individual sectors or groups along a particular supply chain of producers, distributors, and consumers. As a result, measures for “successful” development of the production



system in question often remain with the producers while consumers are simply to be informed about better consumption options. Such an approach might not only be ineffective for uptake of innovations but may also miss opportunities for stimulating innovations and developments that cut across sectors and act at a systems level, for example, product service systems such as leasing, sharing, or renting of products. This approach also tends to assume static boundaries of markets and the predominant application of market activity in achieving particular livelihood goals (as opposed to potentially incorporating other non-market livelihood approaches). There is also often only a short term future orientation related to traditional business cycles and forecasting as opposed to visioning and measurement tied to the long term time horizons associated with sustainable development. A long term focus assists in charting new trajectories for alternative (and complementary) development paths, opening up spaces for creative technological innovation and, as importantly, the potential for collaboration and risk sharing that long term visioning affords.

To support more SCP, a system of education of actors along supply chains would need to have a strong sustainability dimension related not only to its content but also to the capabilities needed to engage, partner, innovate, and, where possible (or necessary) redefine the entire system. Challenges and innovations for SCP concern all who are engaged in the direct and indirect support of market and non-market relationships in the areas of policy, design, management, distribution, sales, and the end-of-life of products. For example, change to a longer-term visioning horizon would require learning that presupposes a “redefining of resources” that emphasise the importance of investments in human and social capital (i.e., individual and public education) and enables a diversity of SCP and other developmental pathways to be explored in relation to sustainable development outcomes. This allows a questioning and exploration of existing path dependencies against the holistic framework of sustainable development that should, in turn, define what is meant by success in a green economy. RCEs in different regions offer examples of innovations that could inspire new, and diverse, models of production and consumption that are more inclusive, resilient, and built on the strengths of their communities. RCEs have facilitated access of local farmers to a market of local individual consumers (in RCE

Makana) and organisations (in RCE Skåne), an opportunity for the local unemployed to engage in production of sanitation services (in RCE Makana), opportunities for communities to establish a system for sharing productive capital that, previously, remained underutilised (RCE Saskatchewan), and engagement in productive environmentally sustainable practices for those who were previously in conflict with conservation efforts (in RCE Cebu and RCE Lucknow). To address the challenges of SCP further, it might be important to recommend provisions where consumers become more closely engaged in the design of SCP systems through discussions with producers, policymakers, and civil society organisations.

Ultimately a focus on each individual having a sustainable livelihood encourages individuals to see themselves simultaneously as producers, distributors, and consumers within their own livelihood. This requires the institutional and policy frameworks that enable this integration within one’s own livelihood to take place. It also requires the material conditions, education, and training needed for individuals and autonomous communities to advance their production possibilities in ways that promote the viability of existing social institutions and the ecosystems on which they depend.

ESD communities have demonstrated an ability to open up neutral spaces through innovative governance structures that enable positions to be taken that might otherwise be perceived as too politically sensitive and, therefore, ordinarily not possible. For example, in response to a call by government authorities for public feedback on a proposed plan for developing a nuclear power plant in the province of Saskatchewan, Canada, individual faculty members of higher education partners of RCE Saskatchewan were able to offer their scholarly and technical expertise from a long term sustainability perspective. Such input would otherwise have been too sensitive for any one particular higher education partner organisation to put forward, especially given a very short timeline for public input. In this significant case, the RCE provided a responsive platform for scholars with a commitment to sustainable development to collectively explore and propose alternative and appropriate courses of energy development.

Paving the ways for new Learning Systems

In terms of governance, RCEs provide a new way of structuring scholarly work through participation in multi-sectoral partnerships dedicated to ESD. These networks transcend (yet involve) traditional academic organisations while preserving and enhancing academic freedom for individual scholars. This kind of institutional innovation in knowledge production and scholarship for sustainable development may be an essential part of transitioning to sustainable production systems. One can look historically at other multi-sectoral scholarly partnerships that have formed outside the traditional academy and emerged at critical moments when existing production systems have been in crisis. These partnerships have generated new ways of knowing that have underpinned subsequent transitions to new production systems. For example, the Royal Society of London formed in 1662 played a central role in the rise of scientific inquiry, with this scientific knowledge being central to the industrial revolution that began in the mid-18th century. Similarly, an even earlier innovation in scholarship is found with the creation of Trilingual Colleges in the early 16th century. These colleges taught students proficiency in classical Latin, Greek, and Hebrew, enabling access to (and a better understanding of) ancient texts (including biblical texts) written in these languages. The Trilingual Colleges (such as the Trilingual College of Leuven in Belgium founded in 1518) played a central role in the rise of humanism which, in turn, led to broad social improvements and organisational innovations. Understanding the parallels between these early institutional innovations in scholarship (later formally incorporated into universities with the creation of departments in the humanities and sciences) point to the kinds of structural innovations needed in scholarship at the present moment. Interestingly, the global RCE movement (now comprised of more than 100 RCEs) shares important parallels with the earlier development of the Trilingual College of Leuven and the Royal Society of London (Petry 2012¹). These structural parallels coupled with the rapid rise of RCEs since the start of the UN Decade on ESD in 2005 (which, in itself, is institutionally remarkable given their relatively modest levels of financial support) point to the RCE network potentially playing an indispensable role in negotiating a transition to sustainable production

systems globally (including the creation of a green economy and socially just society).

Growing from Within

Diversity of development options is vital in green growth discussions, as economic growth not rooted in a societal and cultural context can seldom bring about sustainability. For a large percentage of the global population who live in a subsistence state, livelihood is directly linked to a high dependence on biocultural diversity and ecosystem resources. Community worldviews, reasoning methods, values, norms, knowledge practices and technologies which are connected to local systems of stewardship in such societies are often marginalised in an aggregate growth model. Local knowledge practices or grassroots innovations do not get linked to productive occupations and livelihoods due to changing socio-cultural production processes, lack of legitimacy for informally learned skills, challenges of intergenerational transfer of such knowledge, mismatch or conflicts with mainstream knowledge systems, lack of access and right to resources, and inadequate mechanisms for intellectual property right protection.

Specific local needs and growth aspirations of such communities can be met through harnessing local resources and existing knowledge, strengthening necessary skills, and creating a facilitating atmosphere through minimal external inputs. Various resources such as natural resources (for example land, ecosystem, climate, bio-diversity), human resources (knowledge and skills, local concepts, ways of learning, teaching and experimenting), produced assets (infrastructure, local technologies), economic institutions (markets, incomes, legitimised ownership, price relations, and credit), social resources (community organisations, social institutions and leadership) and cultural resources (beliefs, norms, values, and lifestyles) can be crucial in a locally relevant development model while appropriately integrating external resources (Haverkort 2003²). Such an approach often gives better control of development options and processes while also retaining benefits locally that can be sustainable in the long run.

¹ See Roger A. Petry, "Achieving Sustainable Production Systems through New Multi-Sectoral Scholarly Partnerships", ch. 15, p. 110.

² Haverkort, B., Katrien Van't Hoof, and Wim Hiemstra, eds. (2003). *Ancient Roots New Shoots*. Leusden: ETC/Compas and Zed Books.

As in the case of RCE Lucknow, facilitation of indigenous communities' capacities and assets has generated sustainable livelihood options locally. Their work with the Tharu indigenous community whose lifestyle totally depend on nearby forest resources for livelihoods, food, fodder, health as well as social and religious ceremonies, has generated a favorable natural resource management programme while fostering better quality of life in the community. Harnessing locally available resources to increase soil fertility, promotion of local indigenous varieties for improving food security, adoption of alternative and proximal renewable energy options are some of the examples of how growth can be achieved through an endogenous development approach. Instilling the confidence of a set of community level decision makers, and reinforcing the notion of shared natural as well as cultural resources has led to increased autonomy and better self esteem within the Tharu community.

Challenges of transition to a Sustainable Society and Green Economy

In seeking appropriate transitions to a green economy in particular, and a sustainably developed society more generally, one needs to keep in mind advancements in understandings of quality of life and well-being since the early emergence of sustainable development discourse. In this case, the idea of poverty has been broadened to go beyond the traditional understanding of poverty as "income poverty" and is now understood in relation to exposure to adverse risks and a deprivation in well-being. This makes advancements in the understanding of the concept of well-being central to understanding what meaningful and appropriate transitions for sustainable development look like. Well-being is also central to developing appropriate measurements for advancement or progress. Given the contextual nature of human well-being, there is also a need for contextualised measurement of progress (as opposed to only using macro assessments that overlook these important local dimensions). At the same time, one also needs to implement at a policy level national and international measures of well-being in a way that captures the breadth of the concept of well-being (for example, various measures of gross national happiness) and enables consideration of a broad range of social investments and organisational strategies. The implications for well-being in relation to the marketplace in general, and the green economy in particular, also need

to be thoughtfully considered. For example, one needs to consider how production and consumption systems currently relate to satisfying basic needs (such as food, shelter, and health) along with one's personal security and capacity to overcome emergencies. In addition one can reflect on the role a meaningful and sustainable livelihood (including one's livelihood activities in the market) plays in ensuring one's own autonomy and advancing a sense of self or identity. In addition to one's capacity for self-actualisation one can also consider the broader contribution of sustainable livelihoods to collective well-being to the extent they advance a greater degree of equity, respect for individual and collective rights, and social cohesion.

Learning towards Sustainable Development: Embracing market and non-market solutions

In order to discuss what kind of knowledge production is needed for transition to a sustainable society that promotes well-being, one can first review the goals or outcomes of sustainable development that define what kinds of knowledge production are appropriate. This is doable to the extent sustainable development as a concept is focused on outcomes. One set of outcomes relates to process. Process outcomes are focused on how development occurs – whatever development paths are ultimately chosen. Such outcomes reflect concerns that any process of development respects human dignity and community autonomy along with maintaining environmental integrity (for example, through sustaining habitats). Such process outcomes are achieved through politically transparent processes, implementation and respect for laws governing these processes (for example, support for labour rights and environmental assessments), along with legal and other avenues for appeal with appropriate remedies. In addition, sustainable development has overarching outcomes tied to its two key goals going back to Our Common Future. This involves seeking paths of development that reduce and/or eliminate poverty (in its various forms) and environmental degradation. Positively phrased, these goals involve pursuing development paths that simultaneously support ongoing improvements in human well-being and quality of life alongside improvements in ecosystem health and resilience. These overarching goals embody the idea of progress found in the "development" portion of the concept. A third set of outcomes involve sustaining various

forms of capital (physical/man-made, financial capital, human capital (including capabilities and competencies), natural, and social capital). These forms of capital make possible a multiplicity of sustainable development paths. The value of each is assessed in relation to their ability to achieve the overarching sustainable development outcomes. Sustainable development involves recognising that a number of these forms of capital may not be readily substitutable with each other so that their excess depletion might seriously constrain the choices available to future generations. This concern of sustainable development for various forms of capital also involves addressing risks associated with each. A goal, then, of sustainable development is to mitigate exposure to adverse risks associated with each form (whether traditional risks in relation to physical and financial capital or questions of vulnerability or lack of resilience for human, social, and natural capital). This involves understanding the various hazards to which they each are exposed. At the same time a concern for these capital forms leads to seeking to cultivate conditions likely to minimise or eliminate hazards over the long term while generating positive opportunities for capital formation. With all these outcomes, learning needs to take place. This includes not only an appreciation of what these outcomes might mean in general theoretical terms and at a global scale, but also what they mean in the particular, highly situated social and ecological contexts in which development always takes place.

The power of the discourse of sustainable development (and a danger of positioning discussion of green growth outside of this discourse) is that sustainable development does not prejudge what kinds of development are the best solutions (or at least are better solutions) to attaining these sustainability outcomes. Instead, each is evaluated in terms of sustainable development's (1) process outcomes, (2) capital outcomes, and (3) overarching outcomes (as outlined above). Sustainable development as an activity can involve strategies employing market solutions (such as those embodied in the ideas of ecological modernisation and green growth) but also non-market. More especially, sustainable development explores synergies between diverse forms of development or models of production in situated contexts. For example, in the case of human health, enhancing the voluntary or not-for profit sector's capacity to achieve long term population health outcomes might, in turn, have very positive synergies with

attempts at quality improvement and patient-centred care by market and state organisations delivering formal health care (for example, in hospital settings). From a market perspective, a focus on sustainable development outcomes also allows for a constructive evaluation of the need for economic growth in general and what types of production of goods and services (that is, what kinds of market growth) should be pursued to most readily achieve sustainable development outcomes in an efficient and effective manner. This can include evaluating what kinds of market organisations (such as those employing international investment or forms of local investment) are most appropriate and collaborative opportunities between them in achieving sustainable development outcomes in a given setting. Sustainable development also seeks to maintain diverse forms of social capital, including sustaining market organisations (implicit in the green growth agenda) alongside other organisations (such as the capacities of the non-profit, state, professional, religious, household, and academic sectors). This social capital focus recognises the vital contribution of each type of organisation to various dimensions of human well-being. Sustaining social capital also involves sustaining the institutions that undergird these various organisations. For example, in the case of markets this implies a respect for property rights and self-ownership; in the case of countries, respect for the rule of law and the powers of citizenship. In this regard, global social capital formation and institutional development around a new personal identity, specifically the view that every person ought to have a sustainable livelihood, becomes an imperative. Sustainable livelihoods achieve the overarching outcomes of improving human well-being and ecosystem health. A sustainable livelihood is also one that ensures an individual effectively manages risk, while advancing his or her development of (and access to) a diverse capital base from which to strategically construct a livelihood.

Organisational Innovation for new forms of Knowledge Production

A further form of social capital formation that increasingly seems essential for sustainable development is the creation of new organisational forms capable of the kind of innovation and knowledge production needed to transition to a sustainable society and that has sustainable livelihood generation at its heart. Such structures must generate research and innovation for

particular contexts that create production possibilities (both market and non-market) aimed at the outcomes of sustainable development. RCEs are one example. As learning entities, their focus on research into education ensures their innovations build human and social capital while, as a corollary, creating conditions for innovation in other forms of capital (such as sustainable equipment and building design). Because sustainable development focuses on outcomes, it is not prescriptive as to what specific development paths ought to be pursued but, instead, is open to a wide range of paths. This is analogous to the marketplace, for example, where the goal or desired outcome of an investor in a market, namely a profitable return, does not determine the nature of the investment to be made in terms of the manufacture and sale of specific goods and services. While the openness of sustainable development to a diversity of development paths is one of its key conceptual strengths, it also provides challenges as it is not obvious what types of innovation are needed to achieve these outcomes. This is further complicated by the challenge of trying to achieve simultaneously these multiple outcomes within specific social and ecological contexts. Given the number of unknowns implicit in assessing how this knowledge might be produced, it is worthwhile to examine the results of the global RCE initiative begun in 2005 among more than 100 RCEs now acknowledged around the world.

Characteristics of RCE Innovation for Sustainable Development

In describing the strengths and distinctiveness of the knowledge generated by RCEs, one element that is perhaps not surprising (given the participation of higher education organisations in RCEs) is that knowledge is freely pursued by RCEs. This mirrors one of the basic assumptions of universities, namely academic freedom reflected in investigator driven or curiosity driven research. Yet there may be deeper structural reasons for this freedom as well, to the extent RCEs are self-organised and mobilise resources from their members on a voluntary basis. Such mobilisation presupposes a freedom of choice on the part of each RCE participant. The view that RCE partners require partnerships in order to achieve their desired research ends tied to sustainable development also implies the need for flexible collaboration among participants (with no one partner asserting a single agenda without considering those of others). The need

Box 6. Critical characteristics of learning within RCEs

Research problems and methods emerge from local problems in communities; these, in turn, drive regional sustainability innovations;
Respecting and including different kinds of knowledge, including indigenous ways of knowing;
Encouraging transdisciplinary and holistic research;
Advancing research into models of action research and related methodologies, including participatory action research that includes marginalised groups;
Learning that promotes democracy and equity;
Learning across generations – from early to advanced age and building research aptitude at all ages;
Focusing on inclusive, transdisciplinary themes to encourage broad multi-stakeholder participation.

for RCEs to mobilise further participation likely also requires a respect for the interests of existing and potential participants. While knowledge is freely pursued, it is also constrained in a number of ways. The nature of the research and learning goals of RCEs, namely education for sustainable development, presupposes that it is inherently transformative. It possesses some critical characteristics (see Box 6) that makes it always locally relevant, applicable to life, and meaningful to communities. The transformative effectiveness of knowledge is enhanced or, in some cases might presuppose, participation by communities involved at the formative stages of the learning process. As such, communities themselves help shape the actual scholarly process with traditional researchers acting as participants alongside these. Such an approach encourages the mobilisation and integration of research resources from communities of learners that includes (but is not limited to) scientific knowledge of research partners.

A number of ethical dimensions were noted by RCEs regarding how their research is conducted that would supplement the process outcomes of sustainable development identified earlier. RCEs noted the need to do research on how to engage communities to make effective transformation for sustainable development. This required research for capacity building where key capacities included leadership, bridging boundaries and interfacing, problem solving, and facilitating solutions. In addition, to the extent research depended on community contributions, RCEs identified a need

for acknowledgement and appreciation of sources of knowledge and other contributions made by the community. RCEs also cited concerns reflected in the long term time horizons associated with sustainable development. Those involved in RCEs expressed a need for a long term commitment to communities within their respective RCE regions. This long term commitment was, in turn, connected with building trust. In terms of the knowledge and other research outputs of RCEs there was a concern that this knowledge be respectful of ethical boundaries. Applied knowledge had to be linked to appropriate innovation for the particular community. A further ethical duty for RCEs that, in turn, builds further community capacity, is the responsibility to disseminate knowledge. RCEs develop programmes to immediately transfer knowledge to communities, in particular, promotion of RCE research directly to its stakeholders.

Concluding Remarks – RCEs' contribution to Sustainability Governance

RCEs as a governance system are well positioned to advance green growth and sustainable development. Central to this role are the range of communication strategies available to RCEs. The effective and efficient employment of such strategies requires the development of communication models for RCEs (for example, for websites and newsletters). These communication strategies, especially those for public (informal) education, can include major companies and cultural industries. In turn an RCE can assist its partners in tracking community engagement and affirming it. In terms of intellectual property issues associated with collaborative RCE research, RCEs noted the value of open access journals and other mediums along with the value of RCEs and the UN University adopting open access policies enabling broad access to the research results of RCEs. RCEs as an innovative governance model involving higher education organisations enables effective and efficient mobilisation of scholarship for green growth and sustainable development. RCEs can effectively enhance the capacities of higher education organisations and provide positive implications for traditional scholarship and research. RCEs enable strategically linking universities in RCE research processes (as already described) along with feedback of research results back to academic communities. Higher education organisations can make use of existing collaborative partnerships of RCEs, both regionally and

globally. These partnerships can assist higher education in making use of local resources and traditional technology in advancing research. RCEs assist in deliberately including particular groups within and outside higher education in advancing sustainable development. This includes deliberate inclusion of traditionally overlooked disciplines (for example, social work and the humanities) and groups (for example, indigenous peoples, community services groups, faith organisations, entrepreneurs/chambers of commerce, SME associations, cooperatives, and labour organisations). RCEs also become an important platform for university research into education for specific transformative technologies. Networks between RCEs can readily be established to discuss methodologies and capacity building of researchers. This inter-RCE collaboration can help build a practical awareness of transdisciplinarity among researchers, develop case studies of effective RCE research approaches, and create modules on how to do research useful for diverse settings appropriate to the research context. These new models of research can, in turn, be shared back with the participating universities, colleges, and technical institutes.

While this overview of the learning facilitated by RCEs is not exhaustive, it does provide an important snapshot of key principles and strategies practically being employed by RCEs in advancing ESD. RCEs, due to their structure, have capacities that help synergistically advance many of these strategies. They also illustrate specific ways of conducting research that, when employed, are likely to simultaneously advance the multiple sustainable development outcomes previously discussed. The process outcomes of sustainable development are reflected in the need for research conducted in a way that respects the dignity of individuals and their communities in the research process and develops research outputs appropriate to the economic, social, cultural, and environmental needs of communities. Sustainable development outcomes associated with sustaining various forms of capital (including both assets and capabilities) are also advanced. RCEs recognise and build research strategies tied to vital contributions communities are able to provide in defining research problems, identifying appropriate methodologies, and implementing knowledge for sustainable development. RCEs, in turn, enhance this human and social capital formation. RCEs also help share the in-kind and financial costs of sustainability research aimed at the long term



among RCE partners – research that, in itself, is inherently risky due to many unknown parameters. Much of the work of RCEs focuses on building the capacities of diverse RCE partners and individual citizens to develop and implement new knowledge for sustainability. Local projects, in turn, once implemented will build appropriate human, social, natural, physical, and financial capital over time. Finally, the overarching outcomes of sustainable development (advancing progress related to human well-being and ecosystem health) are also advanced. Deficiencies with respect to each overarching goal (whether human poverty and vulnerability or instances of ecological degradation) are tapped into at local and regional levels as a source for developing research problems to be addressed. Cross-cutting themes and educational issues associated with these diverse sets of regional problems also then readily emerge. To the extent the new forms of grounded scholarship for sustainable development enabled by RCEs is intellectually, emotionally, and spiritually a part of what makes life worth living, these too become key components of human well-being and integral to the promotion of sustainable livelihoods.

RCE Makana: Towards a Change Practices Approach to enhance Sustainable Livelihoods in Makana

Rob O'Donoghue

The Makana and Rural Eastern Cape RCE

The Makana RCE has developed as an open forum for reporting and deliberating local initiatives in community-engaged environment and sustainability change.

The RCE secretariat is hosted in the Environmental Learning Research Centre at Rhodes University. It does not raise funds but encourages collaborative initiatives across Makana Municipality and the rural Eastern Cape of South Africa.

Achievements

Two intermeshed RCE initiatives in local food production and marketing serve as an example of some of the challenges faced by communities that are learning to change:

- The beginnings of a successful partnership in support of a Saturday morning market that strengthens local production and consumption; and
- A youth and student-led community initiative that installs aerobic composters to support home food production and reduce the waste stream.

Background

Makana Municipality is centred on the small, historical university city of Grahamstown in the Eastern Cape. With the 1994 demise of apartheid and a recent regional change from a predominance of stock farming to game farming and eco-tourism there has been rapid urban growth. This change has led to many small land holdings being consolidated into larger game park blocks, displacing many farm workers to urban settlements where there are high levels of unemployment. The changes have also shaped a deepening poverty that is now being further exacerbated by the recent slowdown in the global economy and an attendant loss of further jobs as the market economy levels out.

In the past, the utopian ideal of 'the urban native' retaining rural links for a return to subsistence food production in rural areas is an image that underscored colonial and

apartheid policies of influx control (Huxley, 1934). Today, however, the links between urban and rural are far more diverse. Westaway (2011) points to how urban-to-rural monetary flows have starkly decreased since 1994, a period of post-colonial change that has also seen a decline in rural subsistence food production as the market economy penetrated the rural sites of apartheid control and resistance. Here, patterns of local production were rapidly transformed within an expansion in the reach of the market economy that was not accompanied by the provision of employment without migration to urban sites of production.

Westaway notes with irony that the monetary shortfall in rural livelihoods has been recovered by social grants from government. These had been initiated to reduce poverty and not simply entrench this in a market economy system that drove migration and a reduction in rural production¹. He ascribes much of the inertia here to continuing segregationist governance, illustrating that there has neither been a coherent policy response nor an adequate grasp of the drivers and consequences of widening rural and urban poverty.

In this chapter, patterns of production and consumption are seen within this complex and shifting picture of change. It is to be read with a critical eye for how the drivers of the market economy and its mantra of sustainability through transition to a green economy are likely to remain oblivious to the production of poverty as one of the key outputs of the current market economy and its growth-orientated marketing practices. The narratives on some of the small-scale initiatives examined are in line with the logic of a return to local production and consumption (UNESCO, 2012) but with a critical eye on how a green economics business as usual perspective is likely to continue to produce an expanding poor.

¹ The most vivid example of this is how collusion in the milling industry enabled the large companies to control the price of flour and to extend their market reach into the rural areas where small commercial and communal production closed. The outcome has been lower rural production and higher bread prices as delivery to outlying areas is more and more expensive with recent increases in the fuel price.

A photograph of a rural settlement. In the foreground, a large, leafy green tree stands to the left of a traditional house with a thatched roof and light-colored walls. The house has a dark wooden door. In the background, another similar house is visible, partially obscured by the tree. The scene is set in a lush, green environment with dense foliage and trees in the background.

...there has been rapid urban growth. This change has led to many small land holdings being consolidated into larger game park blocks, displacing many farm workers to urban settlements where there are high levels of unemployment.

Sustainable Livelihoods and Education

A change-practices approach to mediating more sustainable livelihoods, along with an agency to resist some of the appropriating and exclusionary market forces at play today, is examined against the shifting complexity of this picture. This practical and locally focused approach to changed production and consumption patterns has slowly emerged amidst a frustration with failed interventions of short duration and recent expert mediated green economy initiatives² undertaken in response to the risks associated with environmental degradation and climate change.

The practical approach being discussed is one which attempts to support and understand some of the less evident dimensions of sustainable livelihood practices, notably:

- A sustainable practices approach that questions why the knowledge into action convention has not been producing the desired change; and
- A capability approach to local agency, where close attention is given to heritage knowledge and the prevailing drivers of micro-economic processes.

These orientating perspectives have been developed within a careful review of the challenges of the prevailing perspectives on environmental education (EE) and education for sustainable development (ESD), which are steered by a modernist ideal of acquiring competences to take knowledge into changed practice. This chapter focuses on the practices that are producing this approach and in exploring how a practical changing-to-learn approach might add to how ESD is currently being narrated in the RCE Network. The rationale and stories examined must also be seen against the complex patterns of change in the southern African contexts in which they are playing out.

The emergence of a Practices Approach

Popkewitz (2000) reveals how education emerged within the modernist project as ways of mediating risk. ESD thus

naturally took the form of awareness creation imperatives in the assumption that change would come about through the knowledge informed actions of concerned citizens. Whereas this knowledge into action approach resonates with the ideals of rational modernisation, it is somewhat blind to a 'primacy of practice' in human orientation and change initiatives (Bourdieu, 1998). This tension and the experience of change being slow and tenuous has suggested that prevailing patterns of practice can often be relatively robust and be held in place where, as Elias (1991:137) notes, "... a continuous process of knowledge transmission and growth can bind to each other the knowledge traditions of different countries and peoples."

This reading of social relations allows us to note how practices are borne of intermeshed patterns of doing, relating and communicating that come to have orientation functions which are both derived and sustained within the social, material and political processes of their natural constitution. They are thus both robust and held in place within what Kemmis and Mutton (2012) refer to as **practice architectures**. Thus, one often finds a knowledge-into-action narrative of awareness for change that can be somewhat short-lived and seldom achieves more than social imaginaries that typify many of the eco-social movements of today³.

It is thus hardly surprising that modern education imperatives orientated to mediating awareness and knowledge-into-action might usefully be held over in favour of an **exploratory process of changing-to-learn**. Here the know-how borne of a situated engagement in change practices is being explored as a complementary dimension to the more conventional emphasis on awareness and **knowledge-into-action**. Put simply, the emphasis here shifts to community-engaged service and practical research, a change-practices approach to social learning that sets out to explore and find out about what can be done within the resources available and what might prove to be worth doing for better quality of life with that attendant rewards and satisfaction this brings.

² Here the provision of solar water heating to the poor is an interesting example.

³ Perhaps the emergence of social movements will be part of the production of imperatives that begin to produce change, transcending the modernist knowledge into action process that is proving somewhat limited as a driver of change.

⁴ Here urine diversion toilets, rotary plastic rainwater tanks and passive solar heaters are notable.

Community-engaged Change Practices within a Capabilities Approach

Over a two-year period of working with a change practices approach to environmental education, it was noted that many of the low impact technologies had broken down and were not easily repaired locally⁴. RCE Makana thus began to rework and select simpler and more situated practices. The livelihood focus was derived using the Millennium Development Goals and the WEHAB framework (Water, Energy, Health, Agriculture and Biodiversity) to which Sewage, Transport and Waste were added as the change practices expanded. This allowed the RCE and partners to start with existing practices within the capital of heritage knowledge practices (HKP) and within the capabilities of the partners to work with very little in the way of funding support. The decision to proceed without funding was an explicit choice on two fronts: firstly, sourcing funding takes time and most often shapes activities in specific ways; and secondly, working with the capital within a context is most likely to align with and be taken up within the perspectives currently at issue in livelihood practices.



The outcome of this approach was an emphasis on small-scale practice reflected in Figure 1 with few being innovations to be brought in and most developing from change practices that extend from heritage knowledge practices (HKP).

Fig. 1 Handprints for Change: Community engaged change practices

WATER (HKP: Water pot)	AGRICULTURE (HKP: Izala)
Rainwater tank	Flip compactor
First flush	Worm farm
Ceramic filters	Wire-tie shade house
Filtering grey water	Chicken tractor
	Biochar drum
	Sundrier
ENERGY (HKP: flame/coal)	BIODIVERSITY (HKP: Take forest)
Clay stove	Acacia fire woodlot
Cobb charcoal oven	Micro nursery
Volcano kettle	Micorrhizal
Sun stove	3 step potting soil
Hot boc	
Solar water heater	
Solar cell	
Wind generator	SEWAGE (HKP: Dry toilet)
	Urine separation toilet
HEALTH (HKP: Slow food)	WASTE (HKP: Izalene)
Tippy hand washer	Reuse padding
Soured milk	Hand made paper
AmaRewu	Making fire-bricks
Sourdough bread	Community engaged change practices
Hand mill	
TRANSPORT	
Solar e-bike	
Trailer	

In examining the emerging change-practices approach in the RCE, two intermeshed case examples that are currently unfolding are worth highlighting:

- i. A Saturday market structure provides a hub for local production and changing patterns of consumption; and
- ii. A neighbourhood cleaning and greening initiative started by a group of unemployed youth.

These examples reflect how the emergence of an informal structure to market local production has become a hub for local food production, and how a local youth cooperative entered the mix to stimulate local food production.

The intention is to review how a market structure and some innovative change practices are exhibiting an emerging potential for a mix of local initiatives that are affecting small changes in local patterns of production and consumption.

Interesting initiatives have emerged around the Saturday Market, initially started by a student and then taken up by a local vegetable producer and various stall holders selling the foods and crafts that they make. This has been accompanied by an exploratory sharing of local small-scale RCE partner initiatives to improve livelihood practices. Each initiative is explored as an open-ended activity with potential and with emergent signs of positive social-ecological impact.

i. Saturday Market

At an RCE partners meeting it was noted how an enterprising group had started an open Saturday Market next to the Old Gaol. This soon became a popular place to buy locally grown vegetables, artisan bread, cheeses and fish. As it developed a critical mass and a good customer base the Environmental Learning Research Centre (ELRC), as an RCE partner, was invited to run workshops on local foods and simple change practices to enhance health and quality of life. Some of the initiatives the RCE has supportively engaged were:

- a) A give-away introduction of 100 perennial green kale plants over a period of three weeks before spring planting. The plant had been brought in by migrants from Zimbabwe and is a perennial leaf picker. This culture resonated with the Xhosa practice of collecting and looking after wild leafy vegetables (imifino). Once the growing season began, green kale began to appear for sale in the market. Two people growing it in a kitchen garden came back to get more as theirs were eaten by donkeys and another elderly man lost his in a dry spell whilst he was away visiting his children.

- b) The RCE ran a series of workshops on making Eastern Cape Pot Bread and produced a pamphlet on health benefits of artisan bread. Some of the issues addressed were wheat allergies, obesity and early onset diabetes that were all associated with modern factory-produced bread. Also at issue during that time was the deliberation in the Competition Tribunal and courts where collusion and pricing manipulation amongst the bread industry giants were shown to have led to the collapse of small rural bakeries, and to the public being over charged for what had now become the staple diet of the poor in both rural and urban areas.

Through these responsive initiatives, the Saturday Market is becoming a place to deliberate and engage people on green production and consumption patterns that are health producing as well as satisfying and rewarding in other ways. While nothing has been clear-cut or smooth sailing in the RCE responses, clear patterns of community mediation towards local health promoting production and change practices are now emerging. Most of these are not directly related to RCE initiatives but the RCE is being drawn in and the Saturday Market is becoming somewhat of a hub for widening initiatives and debate. Much of this is amongst the elite and financially secure of the university community but some of the student environment committees are taking up more and more in the way of expansive learning into the wider Makana community and partnering with unemployed youth and service organisations.

ii. Youth Cleaning and Greening Initiative

Makana Municipality supported a recycling initiative in 2010 as part of the Soccer World Cup. This ran into 2011 with the development of various structures that are now beginning to include the contracting of community cleaning co-operatives. The slow pace of change frustrated a youth-run co-op, so its members approached the RCE for support and training. A visiting intern from RCE Delhi, Deepika Joon, worked with them to develop more professional proposals and we provided them with training in community cleaning and greening. One of the proposals was successful and RCE Makana is now collaborating in the development of aerobic composters in Ward 7. These are being introduced at a rate of five per weekend by the youth working with two of the student environment committees, RU-Green and Common Ground.

The interesting dimension of this project is that a local company is donating the scrap materials to make the composters and the concept has been based around a cultural practice 'ethuthwini' (household organic dump) that was discontinued in the early 20th century when these produced health risks with urbanisation.

Conclusion

The idea of 'changing to learn' has been a challenging turn that has revealed how modernist education practices are orientated within an enlightenment ideal of knowledge-led action to produce change. A knowledge-into-practice approach has been at the heart of education initiatives set out to foster a change in behaviour of an identified group. This is often referred to as a 'target group' to whom, for example, the conservation message is to be put across so as to create awareness for the desired knowledge-led action. There is somewhat of a self-referential circularity in this logic of practice and a moral imperative that can exclude directly engaging people in change practice experiences. Here learning is seen as something that participants have first to get to for themselves so that knowledge that is personally meaningful can be carried into action.

Despite surfacing this contradiction in a conventional wisdom of a knowledge-into-practice perspective, care was taken to avoid constituting a change practice approach as a break from the inscribed circularity of mediated structural functionalism. Drawing on Bourdieu's insights into the primacy of practice we were able to juxtapose 'practical reason' with the convention of 'reasoned practice.' This allowed a reconstituting of the education project as a reflexive project of deliberative engagement towards more 'reasonable practice,'⁵ an expansive move that extends beyond the target orientated mediation of structural functionalism to constitute emancipatory social learning as an emergent property in reflexive, critical engagement. Some of the tools to derive a deeper critical purchase towards 'absenting the absences' that are producing exclusionary and constraining modes of production and consumption are being sought with the critical realism of Bhaskar (2008).

The question of the effectiveness of a changing-to-learn approach remains open-ended in the Makana RCE along with a hoped for reduction in entrenched segregationism where market and township might interact in more locally productive ways.

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Through these responsive initiatives, the Saturday Market is becoming a place to deliberate and engage people on green production and consumption patterns that are health producing as well as satisfying and rewarding in other ways

⁵ Roy Bhaskar uses the idea of 'reasonable practices' in a way that refers both to what comes to be reasoned with a real purchase and that which is thus better aligned in a real world at risk.

RCE Lucknow: Sustainable Consumption and Production Practices adopted by Indigenous Community of India

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Neeraj Kr. Pal

RCE Lucknow

RCE Lucknow was officially acknowledged by UNU-IAS in January 2007. Lucknow is the capital of Uttar Pradesh, the fourth largest populated state in India. The state's large population directly impacts the environment and the population size is also linked to poverty, pollution, deforestation, overuse of natural resources, waste generation and waste disposal. The network led by the Centre for Environment Education, Northern Regional Office (CEE North) focuses on promoting education for protecting the environment, management of natural resources and biodiversity conservation. The RCE works closely with the Tharu indigenous communities in the Dudhwa National Park area.



Termite hill, a unique feature of Dudhwa

Project Overview

The communities residing around forests have very limited options for their livelihoods and are mostly dependent on forest resources as the reach of market economy and modern technologies are very limited. Indigenous communities, known as the 'Tharu' tribes, live in Dudhwa¹ forest and depend on forest resources for their livelihoods, food, fodder, medicines, shelter, agricultural implements, handicrafts, non-timber forest products (NTFPs), and social and religious ceremonies.

Traditionally, tribal communities preserve the surrounding environment through their harmonious lifestyles, which are an integral part of their culture. This was also the case with the tribes in Dudhwa, at least until the area was declared a National Park, in 1977. After the declaration, there was a significant change in the resource-use patterns of the community. This consequently affected the forest areas, including both the wildlife and people of the area.

At that time, the community was left with limited options for their survival and livelihoods. Over time, the community grew, as did the demand on forest resources, which slowly started to show signs of pressure on the forest and visible human-wildlife conflicts. Due to this conflict situation, the park authorities and local communities started to clash.

The CEE, based in Lucknow, is the lead institution within the network of formal and non-formal education partners that make up the Regional Centres of Expertise on Education for Sustainable Development (RCE) in Lucknow. RCE Lucknow chose Dudhwa to implement a programme on Biodiversity Conservation and Natural Resource Management (NRM) with the Tharu community in the region. The main objective of the programme was to conserve biodiversity through participatory activities focusing on: improving the socioeconomic status of the community; sustainable consumption and management of locally available resources; strengthening livelihood and energy interventions; and developing institutional mechanisms among stakeholders.

The focus of RCE Lucknow was to:

- Enhance, strengthen, evolve and co-create a space for communication, cooperation and knowledge sharing among all stakeholders involved in ESD;
- Build capacity of community groups and partner institutions towards ESD;
- Analyse and assess knowledge, attitudes, policies and practices related to the protection of the environment and natural resource management in the region; and

¹ Dudhwa National Park is a protected area (PA) with rich biodiversity and perhaps the last stronghold of the wild flora and fauna left in the Terai Arc Landscape of the Indo-Gangetic tract in the foothills of Himalayas. It is India's fourth largest park situated at the Indo-Nepal border in Lakhimpur Kheri district of Uttar Pradesh state. The park is known for its unique landscape having Sal forests, streams, swamps and grasslands which supports a rich biodiversity.



Traditionally, tribal communities preserve the surrounding environment through their harmonious lifestyles, which are an integral part of their culture. This was also the case with the tribes in Dudhwa, at least until the area was declared a National Park, in 1977.

- Educate masses towards sustainable living and livelihoods.

The RCE partnership and networking has added immense value to the project activities by bringing varied experiences and viewpoints together. This project experience shows that it takes time for an external agency to gain acceptance in an indigenous community and to be able to suggest changes in existing systems and practices. It also shows that communities adopt sustainable practices when there are clear economic incentives.

RCE Activities

Realising the strong role advocacy plays, RCE Lucknow began interacting with the Tharu community by organising a series of meetings and discussions. These were used as tools to collect information on the status of the resource base, the existing systems and practices, conservation issues and other initiatives.

A baseline assessment helped to understand the extent to which people were dependant on the forests. It also revealed the resource consumption pattern of the community; resources were used mainly for food, fodder and fuel wood. Based on the results, RCE Lucknow conducted various planning meetings drawing members from diverse backgrounds to draw up an NRM action plan.

The action plan outlined areas of interventions for strengthening community members' livelihoods and their appropriate skills through capacity building, training and exposure visits. RCE Lucknow interacted with various institutions and departments with the possibility of collaboration to strengthen the efforts in the project areas.



Fishing done during monsoon period by Tharu women in buffer zone

Government departments, NGOs, academic institutions and other partners including those engaged in the promotion of organic agriculture, handicraft training and marketing, rural development, forest protection, tribal welfare, non-conventional energy development, and entrepreneurial development, agreed to join hands with the RCE in implementing the various activities.



Learning sustainable agricultural techniques

Agriculture is a core livelihood activity of the indigenous community in Dudhwa. RCE Lucknow encouraged the community to conduct a self assessment of their agriculture practices, in the form of input and output. This assessment helped them to realise the net benefit of overall investments with their current agricultural practices. Discussions with the community helped identify areas of improvement and capacity needs. To meet those needs, training cum exposure visits were organised with the help of the agricultural university in the region. A selected group of farmers and youth were introduced to various techniques which utilise locally available resources to increase soil fertility, thus providing alternatives to chemical fertilizers and pesticides. Participants were also introduced to the practices linked with agro-forestry in an integrated farming system. Along with this, community members were also trained on other livelihood options, such as poultry farming, piggery, pisciculture. They were also trained in marketing and marketing strategies.

Based on the interest generated in the trainings, RCE Lucknow demonstrated some of the techniques and supported livelihood options for families with little or no land. Exposure visits helped farmers adopt practices

which improved soil quality and production of crops and vegetables. Community members were also introduced to backyard vegetable gardening with indigenous varieties of seeds, which helped ensure food security as well as nutritional inputs.

The main source of **energy** for indigenous communities is fuel wood from the forest, which is burned mainly for cooking. In Tharu families, women have the responsibility of collecting fuel wood; they often have to travel long distances, spending much of their time in this endeavour. Burning the wood creates a significant amount of indoor air pollution from the smoke and it is the cause of various lung and eye diseases among Tharu women.



Adopting alternative energy options – demonstration of biogas plant

Energy requirements were assessed based on annual fuel wood consumption and, based on that assessment, key interventions were identified. These focused on reducing fuel wood consumption and also building capacity for adopting alternative renewable energy options. A government agency working on non-conventional energy options partnered on the project and community members were trained in alternative options. Fuel efficient cook stoves, called chulah, and biogas units were demonstrated to community members based on their demands after they saw the success of such units during their exposure visit. The energy demand assessment was done in 40 households that adopted fuel efficient stoves and improved cooking practices.

Keeping in mind the **handicraft** skills of the women in the community, RCE Lucknow identified an agency working to promote and market tribal handicraft products. Artisan women groups were given training to improve their designs for better marketability. The products prepared by the women – such as baskets, hand fans, file folders and mobile covers – became very popular.



Handicraft products prepared by Tharu artisans

Based on the newfound popularity of the products, RCE Lucknow planned another set of trainings on carpet-making, wall-hangings and other handicrafts. The products developed during the training are under market testing at various outlets situated in some major cities of India. With Tharu handicraft products entering the commercial market, it was felt that the artisan group needed to upgrade their designs in order to keep up with demand. RCE Lucknow facilitated a 45 day design training workshop and now all the women artisans are earning an income from their handicraft products and supporting their families.

Selected members showing interest in **livestock** rearing were given training on productive livestock management. The training helped community members to better understand productive livestock management practices, benefits of stall feeding, improved breeding of livestock, and prevailing diseases in the area, while motivating them to take these practices up for livelihood generation.

The success of any intervention depends on the level of education and awareness of the target group. By providing information and success stories, and discussing challenges and possible solutions, community members are given the opportunity to develop their thinking to successfully adopt new ideas and techniques. In the project area various approaches adopted included theme-based trainings, brainstorming discussions, exposure visits to showcase positive demonstrations, and technical sessions, among others. Awareness events were organised using popular folk media such as puppet shows, fairs, and local songs. Each intervention of the project emerged from the community's traditional knowledge system. For example, traditional stoves were improved so as to consume less fuel wood. The new models of stoves were demonstrated and explained to the community. As a result, the community adopted the new model. Similarly, handicrafts made from park grasses were adapted to make use of other raw materials while maintaining the original traditional designs. Education and awareness also helped in bringing the desired behavioural changes in regard to the use of natural resources in the area.

The women artisans are now earning an income from their handicraft products and supporting their families

Schools play a key role in motivating community members, since children have the power to convince elders to take positive actions. With this in mind, students at 12 schools situated in and around the protected area were identified and participated in biodiversity conservation education activities.



RCE Lucknow has initiated biodiversity conservation education activities in schools in and around selected model eco-villages. A school education package was developed, which includes posters and a teacher's booklet to guide teachers in conducting various student activities. Various school level programmes have been organised and environment days have been celebrated to promote awareness of the rich biodiversity of Dudhwa National Park.

Impact

The most important aspect of the project was the involvement of community members in the decision-making process. Collaboration and the collective learning around ways to transform the protected area were also marks of success. Well-informed individuals are more likely to make decisions that not only suit their own generation but also future generations. It was thus very important for everyone to understand that the national park resources were shared resources and equally important for well-being of humans and animals.

Traveling on a Sustainable Path

Community members who adopted sustainable livelihood options and agriculture techniques were able to improve their economic condition. Understanding the alternatives available to them helped the community change old patterns of things such as cropping, irrigation, and choice of seeds. This will definitely have a long term and positive impact in the area.

Involving women in decisions such as which stove they would adopt, what vegetables they would grow, and what handicraft products they would make, really triggered a sense of ownership in the project. The health of participants also improved, due to better nutrition choices and improved air quality. Fuel wood consumption has been reduced over time and, along with it, there has been a welcome decline in the amount of labour required to source the wood and bring it back to the community. All this has also had a positive impact on the forests. Improved handicraft skills have increased income generation among women in the community, which has in turn led to a transformation in the society where women are valued as income-generating members of the community.

Through this project, a positive example of change for sustainability has been created that other institutions and villages can consider adopting as well.

Changing Consumption and Production

The project was closely aligned with the government's forest management and community development objectives. At the local level, the government is currently implementing a participatory poverty alleviation and forest management programme, in which these project villages are seen as examples of sustainable interventions. The project also has clear linkages to the national and international mandate of biodiversity conservation and the climate change mitigation agenda. Overall, changing the consumption and production patterns of indigenous communities is helping build society with green, sustainable actions.

The project also addresses the long term goal for achieving a green economy in the region, tackling poverty while simultaneously looking at sustainable solutions. The participation of indigenous communities in decision-making and the involvement of various institutions are together bringing positive change and serve as an indicator of how good governance can make a difference.

Conclusion

The success of this project was the result of strong networking and partnerships among institutions that brought with them experiences and expertise. The educational approaches used during the project helped create attitudinal changes among community members and resulted in the adoption of a number of alternative techniques for sustainability. CEE, as the lead institution, worked closely with partners under the RCE banner, including government departments such as forest, education, tribal welfare, energy and development. Other formal institutions such as universities, schools, and training institutions also partnered in making this successful.

RCE Lucknow still has work to do to transform the project villages completely. The project has raised community expectations for the significant changes that can be made to living conditions and lifestyles. As such, it's important for members of the project village to be partnered with members of other villages so that the good practices can

be replicated. Most importantly, there is a need for regular financial support to ensure full completion of the action plan. RCE Lucknow is currently in discussion with various agencies for financial and technical support of the project villages so that green enterprise can be firmly established for poverty eradication in the region.

Involving women in decisions such as which stove they would adopt, what vegetables they would grow, and what handicraft products they would make, really triggered a sense of ownership in the project.



RCE Delhi: Innovative Approach towards Sustainable Livelihood

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RCE Delhi



Acknowledged as a Regional Centre of Expertise by United Nations University Institute of Advanced Studies in October 2008, RCE Delhi focuses its activities in

and around India's capital city. With a population of 17 million, Delhi is currently the second largest metropolis in the country. Delhi rapidly grew into a cosmopolitan city due to the large numbers of people who immigrated to Delhi from across the country. Its rapid development and urbanisation, together with the relatively high average income of its population, has made the city a major cultural, political, and commercial centre.

The Energy and Resources Institute (TERI) is the lead organisation within RCE Delhi. Other members of the RCE Delhi network include The Centre for Environment Education (CEE), World Wildlife Fund (WWF) India, the Department of Science and Technology, schools and colleges, the National Museum of Natural History, the National Bal Bhavan and the National Science Centre.

RCE Delhi helps address local sustainable development challenges facing the city by building capacity among key stakeholders, and by engaging partners in spearheading activities on sustainable development in the region. The RCE places a particular emphasis on issues regarding

waste, water, urban green belts, transport and migration. The core strategy of the RCE is based on a participatory model for engagement of stakeholders and involvement of citizens at all levels. Over time, this approach has been further strengthened with an effective communications plan.

Youth training and sensitisation has been a major focus for RCE Delhi, with the RCE launching a number of initiatives in this regard. One such initiative is the annual international youth meet, known as YUVA (Youth Unite for Voluntary Action). YUVA provides a platform for young, enthusiastic individuals to come together and deliberate on issues related to global sustainability. Since 2009 these meets have covered themes such as 'Climate Change', 'Understanding Climate Change through Social Glass', 'Road to Global Sustainability via Local Initiatives', and 'Conserving Global Commons: Transforming Knowledge into Action.'

Waste is a major problem in the city of Delhi and it has been identified as the prime environmental issue around which skills need to be developed. A number of partner organisations – namely Miranda House College and National Bal Bhavan – have done work on waste management in their institutions and their surroundings under the RCE banner. The Environment Education group of WWF India and the National Science Centre also play an active role.

Project CARE (Creating Awareness, Skills, and Responsibility towards the Environment) was initiated while keeping in mind the mandate of RCE Delhi and the need to focus on a green economy within the context of various forms of waste, such as organic waste for making compost, use of compost in organic nurseries, and making items out of waste products like plastic bags, paper and cloth. Developing the social and economic aspects of the project helped to further integrate and mainstream it.

Current Project Achievements

The project ensured collaborative learning and skills-development among all the groups involved. It also addressed lifelong learning, which is an essential and integral part of education for sustainable development (ESD). The project helped empower women from low income groups living in slums and created livelihood





opportunities for them, in which they were given the opportunity to earn for themselves. They became more self-reliant and displayed higher levels of confidence. The project also increased the spirit of volunteerism among corporate employees and college students, and peer groups in colleges and corporate offices were motivated to undertake similar activities. Likewise, it encouraged others in the community to develop their skills with the targeted groups, providing them with know-how on various identified skills. Overall, these efforts helped create long term life-skills and thus ensured the sustainability of the project.

Project Context and Background

India, a vast country with diverse people and cultures, has seen its dynamic growth pattern develop and change at a rapid pace. It is also faced with a number of major problems that must be addressed. One such issue is urban poverty, which remains high at more than 25 percent. More than 80 million people currently live below the poverty line in the cities and towns of India (source: NSSO survey report). Migration to cities from the rural areas is growing in leaps and bounds, with people migrating in search of work. With a growing population living in slums, the infrastructure and services of Indian cities are under stress, which has an impact on the natural environment surrounding those areas. Helping vulnerable groups of urban poor to build a sense of security and improve their coping abilities is thus becoming very important. These groups need to be made aware of the connection their lives have with the environment around them and the synergy between their livelihood and their environment. The empowerment of women within these groups is also strategically important.

In a 2009 joint statement on the green economy entitled “Green Economy: A Transformation to Address Multiple Crises”, the heads of a variety of UN agencies stated that: “The shift towards a green economy requires education for sustainable development including training in new job skills and newly required health systems.” A key issue to ensure a move to a green economy is therefore a shift in peoples’ attitudes towards sustainable development, which can be done through raising awareness, public participation and sustainable consumption, as well as skill-building and empowerment.



Against the backdrop of the critical need to improve quality of life and address sustainable issues, TERI and Accenture initiated Project CARE (Creating Awareness, skills and Responsibility towards the Environment) in the National Capital Region (NCR) of Delhi, identifying Sheetla Colony in Gurgaon. The project harnessed the potential of college students and young professionals from Accenture to promote environmental awareness and sustainable development, while enhancing livelihoods in identified communities. The main emphasis of this programme was on low socioeconomic status (SES) urban communities.

Under the direction of the project team and partner NGOs, the target population was sensitised on local environmental issues, and given training on livelihood skills by groups of college students and professionals. The project focused on skill development for livelihood generation. It targeted low income communities in environmentally vulnerable localities to see what type of waste was readily available to them. As it turned out, that waste was mainly paper, cartons, and old clothes. One on one interviews with women and focus group discussions (FGDs) were organised and the results of those discussions identified bag-making (from waste paper, cloth, etc.) as an ideal option. The initiative helped to build awareness on environmental degradation, an understanding of waste items that can be converted to a resource, and it built knowledge on how livelihood opportunities can be created.

As stated in this quote from United Nations Economic and Social Commission for Asia and the Pacific (ESCAP),

a “green economy can be defined as an economy where economic prosperity can go hand-in-hand with ecological sustainability.” ESD can contribute to greening the economy at the grassroots level, as it has the ability to equip people with the necessary competencies and skills.

Approach

A participatory approach enabled different stakeholders to understand each other, work together, and look at livelihood opportunities, while building a sense of responsibility towards the world around them. Data was collected on the major environmental issues in the selected site, which was the Sheetla slum Colony in Gurgaon, Delhi NCR. Data was analysed to ensure that the project sites selected were inhabited by the appropriate target population, from a low socioeconomic strata, and that there was a pressing environmental issue that needed to be addressed.

The project team used various tools to select the communities that would be targeted and the youth group that would be a part of the project. A needs assessment was conducted in the identified localities and reconnaissance visits were conducted to assess the level of expected engagement as well as economic dynamics in the area. Resource mapping and community mapping was also done and participatory rural appraisal (PRA) tools were applied to draw the community profile and better understand the socioeconomic status, gender, occupation, average income, and professions of the participating group. Those tools also helped to better understand environmental metrics in the region, especially those involving waste and water. Meetings were held with various government officials, NGO's and local community leaders to gather baseline data on the community and to build the profile of the migrant population which comprises more than 50 percent of the population.

Youth and young professionals were selected to act as catalysts, keeping in mind the need to raise their understanding of marginalised segments who, with some guidance, can be mainstreamed into society through development of professional skills. The project would eventually provide these groups with an understanding of the links between a green economy and sustainable development.

The youth and young professionals chosen mostly came from a very different social and economic background from that of the target community they were working with. By creating synergies between these two groups, the project created long term sustained partnerships and benefits for all.

The youths in the group were identified based on their interest and experience of working in the community, and with the assistance of college authorities and senior teachers. Sensitisation programmes were conducted for them prior to their interaction with the identified community to give them the tools to ensure a high level of communication and interaction with those in the community.

A solid understanding of the problems and issues helps to ensure high quality guidance. Also worthwhile were the efforts of the TERI team and partner NGOs who worked in the identified communities with hands-on training programmes prior to the introduction of identified life skills. Special sessions on a participatory approach of working in the community and awareness sessions on environmental issues were carried out.

It is important to customise a programme to the local environmental problem and to the specific community concerned

Such efforts are critical since ESD looks at a holistic approach to integrating the three pillars of sustainability – social, economic and environmental – and aims to bring understanding and benefit to all groups and segments in society. Through this project, the community was socially and economically empowered and made aware of the environment around them. Along with them the youth and young corporate professionals became more sensitive to the needs and desires of the community and thereby took the programme forward.

The youth and young professionals were given the lead along with a local NGO and the project team to conduct training sessions for women in the community and other stakeholders. The training sessions included identified livelihood skills and creating products from waste,



such as plastic and paper bags. This income generation activity was selected based on the analysis, studies and group discussions that had been conducted in the community.

In addition, market linkages and the economic benefit of the products were discussed in-depth to ensure sustainability and continuity. Development of skills in these areas eventually looked at the overall contribution to the transition towards a green economy, since the product, its economic benefits and market linkages will have a positive impact on sustainable development.

Regular focus group discussions, interactive sessions and group activities among all stakeholders were organised throughout the project period to ensure that any problems, such as working in groups or data collection, were addressed immediately. Interviews were also held with local NGO members, leaders, and ward members in the community to get feedback on the activities.

Lessons Learned

It is important to customise a programme to the local environment and the environmental problems that are of concern to that specific community. The project exposed some of the challenges of working with corporate employees, due to their time constraints and work-related pressures. However, when these young professionals came into contact with the social problems of the identified groups, their understanding of the problems

and their motivation to improve the lives of those in the concerned community by developing identified skills and providing avenues for market linkages was clearly seen. Building sensitivity and awareness among college youth and young professionals about the marginalised segments in the community is becoming essential. ESD is all about shaping behaviours and attitudes to ensure that sustainable development becomes a reality through the understanding of the issues facing people from these communities.

Challenges

Working with a group that includes such diverse stakeholders is sure to lead to very strong group dynamics. Due to family commitments among the women in the community, many were forced to drop out from the training. It is therefore very important to ensure that community members feel committed to undertaking the activity. For this, the team had to constantly motivate community members, providing them with examples of success stories, and reminding them of the relevance and importance of such programmes. The diverse groups of people who migrate to India's cities often speak different languages, eat different foods and hail from very different cultures. These factors pose a major challenge when working in these communities. Constantly inspiring and motivating corporate employees and students to actively participate and ensuring that they understand the community with which they're working also proved to be a major challenge since each has very diverse

social upbringings. Promoting the concept of sustainable enterprise, looking at sustainable development and the green economy, and creating market linkages were also challenging exercises.

Policy Relevance

ESD can help in creating better-informed policies and in disseminating new understandings to broad swaths of society (i.e. providing input to the complex processes that shape social preferences upon which decisions in democracies are based). The government of India is initiating skills development as a part of one of their schemes to ensure livelihood enhancement and increase the knowledge of livelihood options among youth. Such initiatives can therefore be replicable.

Conclusion

Social enterprises are businesses that not only make money but also solve a social problem directly creating a ripple effect, developing opportunities for other communities to do the same. This project aimed to transform the community women into entrepreneurs and the project had a ripple effect and impacted the social behavior of the community women directly. It also successfully demonstrated that waste, which is a major environmental problem in cities, can also be a source of income generation with assistance from such innovative initiatives.

The project honed the entrepreneurial and life skills of the targeted women. The innovative approach adopted in the project impacted not only community women but also corporate workers and college students.

It helped to inculcate and incorporate a sense of volunteerism among young college students and made corporate employees aware of the inter-linkages between the three pillars of sustainable development.



RCE Vienna: Sustainability Entrepreneurs and a Green Economy

Christian Rammel

Joshua von Gabain

RCE Vienna

RCE Vienna was officially recognised by UNU-IAS in December 2010. The RCE was created as a regional network for research, education and knowledge exchange, with a focus on questions related to regional and trans-regional sustainable development. The coordinating office of the RCE network is currently based at the Vienna University of Economics and Business. With a strong focus on the CENTROPE region – the multinational region in Central Europe encompassing four European countries, namely Slovakia, Austria, Hungary and the Czech Republic – the network devotes special attention to conflicting, at times, priorities of socioeconomic and ecological development, as well as social issues. The RCE highlights topics such as immigration and social coherence, climate change policies, and sustainability entrepreneurship. By enhancing transformative education, RCE Vienna moves from visions about sustainability to concrete actions, providing impulses towards the sustainable economic development of the Vienna region. To cope with the socioeconomic dynamics of the “east-west interface” of the Vienna region, the focus of RCE Vienna has been extended to Bratislava, with the intention of engaging key institutions of formal, non-formal and informal education within Slovakia.

The CENTROPE region

Bratislava and Vienna, being less than 60 kilometres apart, are the two European capitals that are geographically closest to each other. Each contains the highest concentration in private enterprises, universities and research centres of their respective countries. There is thus great development potential for both metropolitan regions to create an innovative knowledge hub for Central Europe. Approximately 4.5 million inhabitants lived in the Austrian-Slovak border region in 2004. Due to the fact that both capitals are situated in the cross border region, the population is highly concentrated: one-third of Austrians occupy 10 percent of Austrian territory, while nearly one-fifth of Slovaks occupy 11 percent of Slovakia’s land.

This cross-border region faces sustainability challenges ranging from sustainable energy systems and increasing traffic, to social cohesion and unemployment. Particular challenges in this area include: interregional disparities of economic activities; an overall unemployment rate of 8.3 percent in the cross-border region (Austria

7.3%, Slovakia 10.3%); differences in legal frameworks; ecological standards and a lack of common monitoring and management of natural resources; limited demand and absorption of innovations by small and medium size companies (SMEs), especially on the Slovakian side; and deficiencies in developing new SMEs, especially in the rural areas of the border region. These problems do not stop at national borders and must be tackled by a wide range of cross-border initiatives and cooperative cross-border projects. In this context, RCE Vienna’s role as a science-society interface is to provide a regional network for research, education and “knowledge interactions” on questions related to regional and trans-regional sustainable development. RCE Vienna enhances the exchange of ideas, knowledge and regional activities between research institutions, public agencies, and organisations in formal, non-formal and informal education in the cross-border region. The network also works on creating and implementing problem-centred education for sustainable development (ESD) initiatives, such as the “Sustainability Entrepreneurs – Vienna/ Bratislava” project.





Bratislava castle and the River Danube



Pallas Athene in front of the Austrian Parliament in Vienna

Project Overview and Achievements

One of the key projects of RCE Vienna is focused on regional entrepreneurs who perform sustainable business activities. The project goes beyond strategies merely focusing on improving eco-efficiency or providing eco-technologies, as these are inadequate for achieving material sufficiency, regional resilience and adaptive capacity over the long term. While the integration of popular corporate social responsibility (CSR) activities is one useful step for achieving a transition towards a green economy and society, it fails to target core problems and processes that lie at the heart of many business models. To coherently address this challenge, firms need to put ecological and social missions at the core of their business models. The following principles should be considered in those efforts:

- The creation, renewal or improvement of products, services, technological or organisational processes should strive to accentuate long-lasting impacts on social, ecological, communal and cultural aspects of regional sustainability. Economic performance should only be seen as a means thereof.
- The projects should address the needs of present stakeholders without compromising the ability to meet the needs of future ones.
- The projects should move away from least-cost economising (reducing inputs without a parallel reduction in outputs) and towards benefit stacking (stacking as many benefits as possible onto each operational activity).
- Projects should also move away from a single-objective focus and towards strategic multiple outcomes of non-commercial objectives.

In short, new forms of development and growth demand a new form of reasoning for organisational design to generate economic, social and environmental dimensions of wealth in an integrative process. As a result, sustainability not only takes shapes in the products, services and organisational form such firms encompass, but also in the business and consumer culture and networks it embodies. At the time of writing, this project had begun its first phase of activities, identifying relevant pioneers and institutions on both sides of the border. Based on the initial studies, the first set of key criteria for sustainability-driven entrepreneurship was developed and checked against the regional context. At the same time,

the RCE is working on the design of the first workshops and related communication initiatives.

Project Content and Background

RCE Vienna's project "Sustainability Entrepreneurs – Vienna/Bratislava" was funded by the WU-Jubiläumsfonds of the City of Vienna and launched in the beginning of 2012. The project was developed to answer two major questions:

1. What are sustainability enterprises and what are their impacts on regional sustainable development? And,
2. What are the barriers and success criteria for starting a successful sustainability enterprise and what support do sustainability start-ups really need?

Notably, this project shifts the attention from conventional business approaches, which address mainly the limited responsibility of entrepreneurs to the new concept of sustainability entrepreneurship. In short, sustainability entrepreneurship contrasts the traditional assumption of a division between business and sustainability goals. Opposing the general trend of "green washing", sustainability entrepreneurship places the integration of business and sustainability together into the centre of business activities. Subsequently, it emphasises a development of business models in a way that puts social and ecological sustainability into the fundamental objectives of business.

The project is aimed at regional entrepreneurs that perform sustainable business activities that go beyond public relations exercises or a shortened focus on eco-technologies and instead focus on the long-lasting impacts of regional sustainability on social, ecological, communal and cultural aspects of the region. Such entrepreneurs are seen as sustainability pioneers and – like many pioneers in an unclear and uncertain situation – they need support. To understand conditions of entrepreneurial innovations better and to support such activities in the region, the project analyses the impacts of the entrepreneurs' work, including success criteria and basic problems. Interestingly, a significant number of the pioneers developed their activities as university spin-offs, starting as students or scientists in the various areas of sustainability research. Eventually they "went for the markets" and tried to translate their academic innovations and sustainability visions into concrete business activities

in the region. In this situation, RCE Vienna's role as a science-society interface is of special importance. With the Vienna University of Economics and Business as its coordinating body, RCE Vienna can provide the necessary network to introduce academic sustainability pioneers to regional stakeholders, facilitating innovative business ideas for sustainable development with the engagement of supportive institutions that can provide start-up facilitations, business angles or new regional partners.

The project is structured along two interdependent research areas focusing on: a) stakeholders, as well as analysis and investigation of the context in which entrepreneurial actions unfold and b) factors that impact transition to sustainable entrepreneurial activities (see Box 1).



Box 1. Two research areas of the project

Stakeholder and context analyses:

- Focusing on identification of the relevant key players and relevant institutions in the cross-border region.
- Recognition of "sustainability entrepreneur pioneers" and their experiences, including perception of barriers and facilitating factors of their work.
- Analysing relevant networks and public institutions in the cross-border region that already support sustainability entrepreneurs.
- Analysing the potential of existing institutional frameworks to initiate and support university spin-offs towards sustainability entrepreneurs.
- Focusing on the identification of effective frameworks for cross-border networks to enhance communication and knowledge transfer between a growing sustainability entrepreneurial community.

Transition research:

- Analysing the current niches for sustainability entrepreneurs.
- Recognition of the key elements responsible for a scaling up process from local niches to regional markets for such enterprises.
- Focusing on the windows of opportunity for sustainability entrepreneurs.
- Analysing the transitory elements that enhance a change from conventional business to sustainability-centred economic activities.
- Focusing on the role of education in this transition process.

Role of the RCE Partners

In the sustainable entrepreneurship project, there are three groups of partners:

1) **RCE Network Partners** are the network partners of RCE Vienna who contribute expertise for organising workshops with regional sustainable entrepreneurs and enhancing subsequent learning and communication processes. In these workshops, sustainable entrepreneurs have the chance to exchange experiences and meet other relevant regional stakeholders and institutions, such as start-up facilitators, consumer organisations and the media.

2) **Public institutions**, such as a Chamber of Commerce or start-up incubators, are linked to regional sustainability entrepreneurs. Start-up facilitators support the founding of new enterprises by offering knowledge, infrastructure, capital, or consulting services.

3) **Regional sustainable entrepreneurs** bring their knowledge and real-life experiences to the regional learning process. They share their challenges and innovative ideas and work together with other project participants on the establishment of a regional cluster of cooperative sustainability business activities.

Within an RCE network, different stakeholders with particular interests and complementary expertise are brought together through communication and knowledge exchange, allowing them to learn together about the different aspects of their regional sustainability challenges.

Expected Outcomes

In essence, the project aspires to gain a better understanding of sustainability entrepreneurs and their impact on regional sustainable development in the Austria-Slovakia cross-border area. Drawing on these new insights, the project partners want to develop an improved institutional framework in the cross-border region for stimulating and supporting sustainable entrepreneurs. This improved institutional framework shall provide a new cross-border learning community where academics, students, entrepreneurs and regional stakeholder can learn from each other, define and communicate the needs and challenges of sustainable regional development and shape business activities to address them.

As the platform for real pioneers and champions of regional sustainable economic development emerges, connections and communication between these actors improve. Additionally, as the RCE brings together, often for the first time, public institutions that launch and support

start-ups and university spin-offs, there is an expectation of new opportunities to put sustainable entrepreneurship on the agenda of such institutions in order to increase the number of sustainable entrepreneurs in the Vienna region.

Role of the Multi-stakeholder Initiative in ESD

From the very beginning of this project, RCE Vienna has been confronted by one fundamental question: why should this project be coordinated by RCE Vienna and what makes an RCE so suitable for the implementation of a project that mainly tackles socioeconomic issues?

There are many answers to this question but two in particular that stand out, since they emphasise the potential of RCEs to support existing efforts to make economies more sustainable. By enabling knowledge exchange between academic research and regional stakeholders, RCEs are acting as science-society interfaces. Thus, new ideas, innovations and particular problems can be discussed within an extended peer community, meaning that innovations, which are at the edge of being transferred into markets, can be analysed and discussed along the lines of the particular demands and problems of regional markets. This could lead to the creation of new markets and new patterns of production and consumption. In initiating such stakeholder dialogue, RCEs networks can answer a fundamental question for sustainability start-ups that, incidentally, is particularly important for the emerging issue of greening the economy: “what do regional customers and society really need?” Without such a process that engages businesses, communities, decision-makers, media, communities and civil society, “business as usual” traditions might overwhelm new alternatives, leaving small-scale experiments behind the walls of academia.

Sustainability entrepreneurs often face the same challenge as pioneers of new ideas: they have to compete against business as usual; they face strong market entry barriers; they lack established networks; they lack substantial funding; and they must fight old mental frames and routines. When it comes to sustainability scientists or young academics, most of the time they understand sustainability problems, have sustainability-inspired visions and know what they want to achieve with their innovations and approaches. However, in general, they lack the knowledge to turn their visions into reality.

That knowledge is crucial for sustainable business ideas, including the translation of social and ecological innovations into entrepreneurship. The learning community provided by RCE Vienna shall tackle this necessary learning process and connect innovations with their practical implementation. Additionally, education, communication and awareness-raising are key for new sustainability concepts to be implemented. Within an RCE network, different stakeholders with particular interests and complementary expertise are brought together through communication and knowledge exchange, allowing them to learn together about the different aspects of their regional sustainability challenges. In other words, within learning communities of RCE Vienna, sustainability innovators have the opportunity to meet potential customers, investors, business partners as well as public authorities.

ESD and RCEs empower people to shape and organise a process towards more sustainable development. ESD gives people the tools to play an active role in more sustainable development and to drive change towards sustainability. This should be of special importance when it comes to university spin-offs. In focusing only on the general level of teaching and educational programmes in higher education – especially on the “what is unsustainable” and “what are more sustainable alternatives” – the “how do we achieve our sustainability visions” is often overlooked. Teaching and research must have a strong accent on the implementation of innovation and knowledge. This is a core issue for RCEs and it is also a particular strength due to the complementary network partners in RCEs. University spin-offs are fundamental examples of scientific research aimed at real implementation and could be seen as successful outcomes of ESD processes within higher education institutions. In aiming at sustainability-related research and teaching, RCEs try to establish bridges between higher education institutions and the regions in which they operate. By reflecting current regional sustainability challenges in various study programmes while engaging relevant regional stakeholders via project-oriented learning, RCEs prepare the ground for concrete activities, such as new university spin-offs aimed at sustainability-related problems.



RCE Greater Western Sydney: UWS Hawkesbury Riverfarm – A living laboratory on education for sustainable development

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RCE Greater Western Sydney

The Regional Centre of Expertise on Education for Sustainable Development – Greater Western Sydney (RCE GWS) operates in the most rapidly developing area of Australia. Greater Western Sydney is a highly diverse region, which has Australia's third largest economy. It faces the distinctive sustainability challenges associated with a culturally diverse, highly dispersed peri-urban area. There is excellent work taking place to address the challenges of social, cultural, economic and environmental development in pockets across the region. This is now being identified, illuminated, linked and leveraged by RCE GWS. The Office of Sustainability at the University of Western Sydney (UWS) is supporting the collaborative design, development, implementation and quality assurance of the Centre. Four major sustainability challenges have been identified for GWS:

1. Transitioning to a low carbon economy;
2. Developing sustainable communities: transport and housing;
3. Ensuring agricultural sustainability and food security;
4. Conserving biodiversity and river health.

Integrating themes that relate directly to these challenges include: public health, developing more active lifestyles, living and working productively with diversity, and economic vitality.



Project Overview and Achievements

The Hawkesbury Riverfarm is a key project of RCE GWS. It is a living laboratory for learning and action-research being developed on Sydney's Hawkesbury River. The UWS Hawkesbury Riverfarm Education Centre is transforming this culturally historic site into a unique real-world learning and research resource linking land, food, culture and water.

As of June 2012, a number of efforts have been launched to great initial success. Among them:

- Work has commenced to renovate and reform the site as a living laboratory for sustainability through a partnership between the University of Western Sydney and Technical & Further Education NSW – Western Sydney Institute (TAFE WSI). This process is supported by a Sustainability Memorandum of Understanding and the RCE GWS banner. TAFE WSI students are specifically developing the key capabilities and green skills identified in their respective national vocational education and training packages as they renovate the site.
- UWS Wildlife Studies students have successfully completed a fauna and flora survey of the site and results are being used as part of a living laboratory programme with GWS schools.
- A funded project involving a partnership with the Hawkesbury Nepean Catchment Management Authority is underway to address river bank restoration with in-kind contributions from the TAFE WSI bush regenerator.
- A heritage survey of the site has been successfully delivered and engagement with UWS engineering and heritage students has commenced. The results are being used to inform the living laboratory programme with GWS schools and TAFE WSI students.
- Indigenous partners of RCE GWS have conducted a preliminary survey of the site, identified indigenous plants and are developing a strategy for engagement with students.
- An RCE GWS Partners Forum on 29 March 2012 formally acknowledged and endorsed the initiative. The RCE GWS Education for Sustainability working group is now monitoring and supporting implementation of the initiative.

The project is a distinctive example of how institutions of primary and secondary, post-secondary and higher education can work in a coordinated way to support the implementation of the new national curriculum for the area and foster learning pathways.



- Discussions have commenced with providers to install Blue Economy demonstration sites on the Riverfarm. These include photovoltaics (PVs) that use both sides of the photovoltaic cell and demonstrations on how micro turbines can be used to generate energy from water flow in ordinary plumbing.
- The Riverfarm has been set down as a case study of good practice of community engagement in the 2012 UWS Engagement Review. Significant lessons on how to ensure an RCE partnership project is productive were detailed in the study.

Project Context and Background

UWS occupies a historic 40 hectare holding of prime agricultural land on Sydney's Hawkesbury River, including one kilometre of river frontage originally gazetted in 1799. The farm complex is comprised of an early 20th century cottage, a series of timber framed farm buildings, silos and a historically significant water pumping tower. The river banks are re-vegetated with species commonly found in River Flat Eucalypt Forest, a listed endangered ecological community. The Darug people are the traditional custodians of the land, and yams and other indigenous foods are still growing on the riverbanks. The Riverfarm has been in continuous operation since the late 18th century and is significant in NSW's cultural history as evidence of agriculture and grazing on the fertile but flood-prone Richmond Lowlands.

The Riverfarm is being developed as a living laboratory for learning and action-research on key challenges of social, cultural, economic and environmental sustainability in the rapidly developing peri-urban region of Greater Western Sydney, Australia. The establishment of the UWS Hawkesbury Riverfarm Education Centre is led by the UWS Office of Sustainability, in partnership with key educational, community and government groups that make up RCE GWS. The UWS Centre is transforming the site into a unique real-world learning and research resource which links land, food, culture and water for a range of educational purposes. To promote knowledge exchange on an international level, the project is to be virtually linked to the RCE Youth Network led by RCE Rhine-Meuse (2012).

The RCE GWS partners that are collectively developing the Riverfarm Education Centre include TAFE NSW - Western

Sydney Institute, the NSW Department of Education and Communities, the Brewongle Environmental Education Centre, the Hawkesbury Nepean Catchment Management Authority, the Darug Custodian Aboriginal Corporation and the Hawkesbury Alumni Charter. The Centre will deliver a high quality engaged learning-for-sustainability experience for the school students of Greater Western Sydney and will provide real-world learning opportunities for vocational education and training students. It will also facilitate increased community engagement and education around sustaining the health and heritage of the Hawkesbury-Nepean River and its surroundings.

The project is a distinctive example of how institutions of primary, secondary, post-secondary and higher education can work in a coordinated way to support the implementation of a new national curriculum for the area and foster learning pathways. It is also a base for the International Waterkeepers (2012) endorsed Hawkesbury-Nepean Riverkeepers project, coordinated by another RCE GWS partner, the Hawkesbury-Nepean Environment Network.



TAFE – WSI pre-apprentice students restoring the Riverfarm buildings. These renovations are including a range of sustainability features.

Construction and restoration of the site – a collaborative project

TAFE WSI's pre-apprentice carpentry, electrical, and plumbing students, under the supervision of their teachers, assist with the rejuvenation and renovation of the site free of charge. In undertaking this community-based learning they are gaining key development skills as part of their training, including the green skills now incorporated in each of their national training packages. TAFE WSI was named Australia's leading educational institute for sustainability at the Australian Training Awards in November, 2010. The Skills for Sustainability – Educational Institution Award recognised the exemplary efforts of TAFE WSI in demonstrating sound sustainability practices and for its leadership in embedding these principles into its training and in the everyday business of teaching and learning (WSI, 2011). The biological science students of UWS are currently undertaking a full mapping of the native and introduced plant and biological species across the site.

Education Strategy

The Riverfarm is part of a broader engagement and education strategy underway across the region to encourage a large proportion of talented low socioeconomic status (LSES) school students in Western Sydney to consider engaging in tertiary study and taking up a professional career, including one that relates to social, economic and environmental sustainability. The real-world learning approach that underpins the Riverfarm initiative gives focus to optimising relevant, active and real-world learning, and peer support. Pre-apprentices in plumbing, electrical and carpentry trades are renovating the Riverfarm and, at the same time, learning a range of green skills as they build a range of sustainability demonstration components into the site. This approach is based on the observation by William Spohn that people are "more likely to act their way into new ways of thinking than think their way into new ways of acting" (2003). What is being built into the Riverfarm gives focus to the key national themes for sustainability education in schools set by the Australian Curriculum Assessment and Reporting Authority and, in vocational education and training, set by Australia's Green Skills Accord Implementation Group.

The Riverfarm offers multidisciplinary education programmes for GWS schools based on a sustainability platform linked to the new national K-12 cross-curriculum focus on sustainability in Australia's schools. The university-level programmes being linked to the site include:

- Science – ecology, water quality, biology, soils and environmental health;
- Engineering – environmental sustainability and risk;
- Heritage and social sustainability;
- Indigenous approaches to sustainability, learning, history and culture;
- Teacher education for sustainability.

Australia's Higher Education Participation Program (HEPP) activities are also being linked to the work of the Riverfarm. They include research and monitoring the impact and effectiveness of activities aimed at improving the participation of students from LSES backgrounds in higher education (Australian Government, 2011).

The Riverfarm LSES programme for School Education is being developed in partnership with Margaret Somerville, UWS Professor of Education, and colleagues in the University's School of Education. A key aspect of the partnership includes a study of the effectiveness of specific activities delivered on the site – specifically by the NSW Department of Education and Community's Brewongle Environmental Education Centre to the schools in the newly formed Blacktown Learning Community – in relation to the following educational goals:

- Increase the awareness of university study in targeted schools and communities;
- Inform aspiration in relation to university study;
- Support students to plan their university pathways;
- Mentor and provide extension opportunities for motivated students.

Evidence from successful intervention programmes elsewhere is being used to identify the optimum support and resourcing strategy necessary for successful and sustained implementation (e.g. Monash University Schools Engagement Program).

Partnerships for implementation

The key implementation partners of RCE GWS, UWS and TAFE WSI in the Riverfarm project are the Blacktown Learning Community and the Brewongle Environmental Education Centre, with the support of the GWS Environmental Network of Schools. All of these partners are members of RCE-GWS. Table 1 indicates the schools included in the Blacktown Learning Community.

Table 1: Blacktown Learning Community of Schools

Blacktown Nth	Schofields
Lalor Park	Quakers Hill East
Quakers Hill	Caddies Creek
Vineyard	Marayong South
Blacktown West	Seven Hills North
Marayong	Seven Hills West
Riverstone	Hambleton
Lynwood Pk	Marsden Park
Crawford	Vardys Road
Marayong Heights	Seven Hills

Evaluation indicators used as students from these schools become involved in the Riverfarm project include:

- Participation rates;
- Student exit surveys after each visit;
- Follow-up in school with associated teachers;
- Subsequent enrolment behaviours.

Lessons for Successful RCE Partnerships

The Hawkesbury Riverfarm partnership has provided important lessons on how to ensure an RCE partnership project is productive. These lessons include:

- Undertaking a stocktake of the particular capabilities and key projects underway by each RCE partner early on in the development of the RCE. In this case, such efforts helped identify a strong, shared interest in developing the UWS Riverfarm as a living laboratory for sustainability for the communities and students of Greater Western Sydney.

- Jointly building a common plan of action and a clear picture of what will be in place when the project is operating successfully.
- Ensuring clarity in the roles and contributions of each partner and setting up clear milestones and indicators of successful implementation against which to monitor progress.
- Ensuring that what is to be delivered is feasible and relevant.
- Allocating a single project coordinator to monitor implementation and ensure inevitable glitches are addressed promptly and wisely.
- Making sure that the achievements of those involved in implementation are identified and publicly acknowledged.

The Riverfarm is being developed as a living laboratory for learning and action-research on key challenges of social, cultural, economic and environmental sustainability in the rapidly developing peri-urban region of Greater Western Sydney, Australia

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RCE Hamburg: Network KOMZET Building and Energy – Safeguarding the future through sustainability in vocational education

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RCE Hamburg was acknowledged by United Nations University Institute of Advanced Studies on March 28, 2008.

The RCE operates in Hamburg and its surrounding area, including the city of Lüneburg. Hamburg, the second largest city in Germany, is a city of 1.8 million inhabitants. It is a prominent economic and cultural metropolis of northern Germany and has a high standard of living. The region has both urban and rural areas, and lies close to the North Sea and the Baltic Sea. The main goal of the RCE is to help people create a sustainable society, especially education professionals and other interested individuals. The RCE helps make people aware about the responsible use of resources, alerts individuals on how their behaviour contributes to climate change, embeds sustainability issues in the curriculum, teaching the meaning of sustainable development, and stimulates behaviours that can become the norm outside of classrooms.

RCE Hamburg focuses on networking and cooperation within the RCE but also with other institutions that foster education for sustainable development (ESD). The RCE is officially represented by the Hamburg University of Applied Sciences, which acts as the Chair, and



Ausbildungszentrum-Bau, the vocational training centre for the main trades of the construction industry, which assists in coordination (UNU-IAS, 2009).

In RCE Hamburg's view, the development and delivery of training, interaction with established education structures, and the promotion of ESD is the key to a sustainable future. The RCE offers new learning materials for use outside the classroom, with content focusing on issues such as renewable energy and the impact of climate change. These materials help students make positive changes in their daily lives. Teachers, lecturers, trainers and others involved in passing on learning are trained according to their new responsibility in teaching ESD (e.g. Hamburg University of Applied Sciences, 2012). Through pilot project approaches for applied ESD, the RCE shows how it is possible to re-orient curricula towards sustainable development in the construction sector (Netzwerk KOMZET, 2012). The RCE also teaches students about the benefits of energy-saving buildings, and provides them with the practical skills to implement these building strategies (Build with CaRe partnership, 2012).

The RCE also highlights behaviours that need to be adopted to make sustainable development possible (Kuntikum, 2012). The Hamburg Institute of Applied Sciences, which is the lead organisation of the RCE, has created the International Climate Change Information Programme (ICCIIP) to disseminate the latest findings from scientific research on climate change, to undertake education, communication and awareness-raising projects, and to enable the networking of experts.



If, as a society, there is the desire to achieve the ambitious climate-protection goals and implement the needed energy policies, success can only be ensured through the development of appropriate information and educational measures.



Project Overview and Achievements

Sustainability is becoming increasingly important for the construction industry. In Germany about 40% of CO₂-emissions are caused by the construction sector. Due to cold winter temperatures, approximately 75% of the total energy consumption in an average building is used for heating. The German federal government, along with the member states of the European Union (EU), has set targets for greater energy efficiency and higher CO₂ savings. As a result, Germany has pledged to reduce its emissions by 40% by 2020 in comparison to 1990 measurements.



One strategic area for reducing energy consumption is in housing construction. In the Hamburg metropolitan region, the "passive house" standard is used by the construction industry as a key energy saving model. However on every one of these building sites, there are many actors who are constructing a passive house for the first time and are not yet knowledgeable about it. There is, therefore, a high cost for quality-management that must be paid by the end-user. This suggests, on the one hand, a high need for training in future technologies, and, on the other hand, for greater quality requirements and communication.

There is also a growing focus on the energy efficiency of existing buildings. Here lurks the potential for many types of error. Errors that are made out of ignorance or

indifference may not easily be overcome. As a result, targeted energy efficiency goals would not be achieved, so that the potential is not ideally exploited. Consequently, there is also a great need for awareness of technically correct and conscientious building practices, as well as knowledge of potential errors, and the subsequent consequences of these for the overall energy balance of the building. For both the areas of new-builds and refurbishments, a good sense of personal responsibility is required, as every individual has the opportunity to do something positive with regards to sustainability in his or her professional activity.

As a result, a key to these sustainable development issues in housing lies in vocational training.

This has been recognised by the nationwide KOMZET network, a network of competency centres for professional training in building and energy. Nine of these centres have joined together as part of the three-year *BauNachhaltig* ("BuildSustainable") project. Within this project, new learning materials are being developed with the intention of improving quality within the construction industry as high quality is a prerequisite for sustainability. These learning modules are currently in the development stage, with the first pilot tests having taken place.

Project Context and Background

Prior to the development phase of the *BauNachhaltig* ('BuildSustainable') project, a survey analysis of small and medium-sized enterprises (SMEs) was conducted within the partner regions to explore relevant learning content. Technical support and centralised examination of the new learning materials and curricula was provided by Prof. Dr.-Ing. habil. H.-J. Holle, Director of the Institute for Applied Building Technology at the Hamburg University of Technology. With its own research and the needs of ESD in mind, concrete ESD-subject matter was formulated.

The following learning materials were included for an integrated ESD approach:

- Developing sustainability-related trade interfaces for problem-solving, new technologies and methods in order to achieve a national standard in vocational training within the construction industry;

- Identifying problems in on-site decision making;
- Developing appropriate quality and systems-thinking from the viewpoint of the craftsman and entrepreneur;
- Assuming responsibility from the viewpoint of the craftsman or entrepreneur; and
- Raising awareness in career guidance and emphasising the importance of the building and housing sectors to sustainability.

The newly developed ESD learning modules will be applied to training, adult education and vocational orientation. Within the apprenticeship process, the RCE hopes to incorporate new learning materials into existing curricula. Through repeated reference to sustainability in the three years of training, illustrated through various practical examples, a model of sustainability is embedded, so to speak. It is essential that students can find their own individual place in the process and realise their own potential for action. In the area of further or continuing education, the programme offers the ESD learning modules to supplement existing courses. Lifelong learning is promoted as the key to professional success and competitiveness within the course of this project, and its importance within the construction industry is also highlighted to students and school-leavers as part of career guidance.

Small and medium-sized enterprises in the construction sector are integrated throughout the process through regular exchange of information and workshops. As of mid-2012, the development stages of the learning modules were underway and the first pilot tests had taken place. At regular meetings, the partners exchange information and experiences. The project has been supported in achieving its objectives through study and scientific monitoring by the University of Hamburg Institute for Professional and Business Education (IBW). The progress of the project is documented in a promotional newsletter. Finally a transfer of results including ESD approaches will be shared with other industries.

The three-year *BauNachhaltig* project is supported by the Federal Institute for Vocational Training (Bundesinstitut für Berufsbildung (BIBB)) with funding from the Federal Ministry for Education and Research (Bundesministerium für Bildung und Forschung (BMBF)), as a contribution

to the second half of the UN Decade of Education for Sustainable Development (2005-2014). A central goal of the UN Decade is to anchor the concept of sustainable development in national education systems. The *BauNachhaltig* project and the field of construction can use ESD to emphasise the joint responsibility of every party involved in a building project to advance sustainable development outcomes. Without this joint responsibility, the overall project would be jeopardised. Therefore the learning modules in this project take into account, not only technological topics, but also the important and necessary interaction of all the individual trades and managers at various points of interface, for example, between the contractor, the architect, and/or the site manager.

The user is viewed as an essential component of the housing system and must learn to behave accordingly – in a similar way to how he or she must adapt to a new mobile phone

The joint participation of the affected trades groups in the learning modules is recommended as there has been proven success with such interdisciplinary learning. This learning success is even greater if one demonstrates how real players must interact in a real-life building process. Therefore, construction is better considered and discussed as a system, since the individual components and elements are often created by different hands. Thus, a higher level of assembly, quality awareness, and communication with one another needs to be practiced. The craftsman's own performance is judged through the overall quality of the building and, if necessary, improved upon. The comprehensive action-based learning methods of German vocational training are integrated in this educational process. Action-orientated learning promotes the independence of the trainee and encourages active and reflective learning enabled through transferable knowledge and behaviour patterns. This ability to operate in new situations every day is an essential component of ESD. The learning phase of this self-contained action module consists of project learning assignments on information, planning, decision-making, executing, controlling, and evaluating.

More knowledge and understanding is required than simply that of construction technology. This is especially the case in modern building designs such as the high energy-saving passive house, which has no active heating system to warm its rooms as it has a controlled mechanical ventilation system with excellent heat recovery. The user is viewed as an essential component of the housing system and must learn to behave accordingly – in a similar way to how he or she must adapt to a new mobile phone. The trainees learn to recognise relationships that affect not only their professional field, but also their private lives. The new learning modules address the needs of companies in the construction sector and their employees. Through this initiative, they are empowered to act in their professional environment and sphere of influence in terms of sustainability. They learn to take responsibility as they understand connections between these spheres, something that they can take into their private lives as well. New behaviour patterns can be transferred and exchanged among their circle of friends or in their peer-groups. For example, energy-saving, resource conservation or the recycling of used materials does not finish at the end of the working day, but can be continued with conscious and controlled power consumption at home.

The learning materials produced in this project fit very well with the many requirements included in the overall vocational training plans of individual professions. It is thus possible to exploit existing frameworks. However, there lacks sufficient time in the training period to deal with all of the learning content to address sustainability issues in-depth. For education for sustainable development to be implemented politically, another solution must be found, so that more focus can be placed on sustainability issues. It is, in general, difficult to maintain consistency in basic knowledge while responding to growing demands for new technological developments in the building sector. The vocational training should always retain a strong practical emphasis. Therefore in the *BauNachhaltig* project, education for sustainable development is accommodated as possible in the active learning and practical exercises. This is especially the case in project-type learning assignments where important connections are recognised. Responsibility, awareness of quality, and effective communication are practiced with other players.

With the BIBB as the responsible institution for the further development of vocational training and, in this case, coordinating the ESD funding programme, exemplary results are being developed through a series of pilot projects. Together with the results from the scientific monitoring taking place, recommendations will be formulated in the period following the project. It is not sufficient to only use the results at the project level or only among the project partners. In the future, knowledge and the concepts must be shared widely. This means, above all, that teachers must be instructed in ESD. Further training for teachers or instructors on ESD teaching methods is of vital importance and must become an essential part of the post-project strategy in order to secure long-term success. SMEs must continue to be involved in the project through a steady flow of information, participation in interviews and workshops, and through trials of the new learning modules. At a workshop of the scientific monitoring team held in June of 2012, transfer options were presented and discussed.

Conclusion

If, as a society, there is the desire to achieve the ambitious climate-protection goals and implement the needed energy policies, success can only be ensured through the development of appropriate information and educational measures. Every citizen has a shared responsibility to ensure its success because every person can – and must – help shape the process of sustainable development. Climate protection and the reduction of CO₂ emissions through energy conservation are generously funded by the German government and often supplemented through local programmes. Many of these programmes offer funding opportunities for private persons and investors. It is not enough, however, to only provide good learning opportunities within the sphere of adult education. Engaging businesses within the building sector is also necessary in order to convince them of the necessity of further training. Unfortunately, there is often a shortage of qualified craftsmen – from planning to execution – to exploit the potential of sustainability. For example, some training courses are only offered for the planners of a passive house, but the contracted craftsmen are not further trained. Even more local initiatives must be created where participation is designed to be easy and flexible for

building practitioners. The *BauNachhaltig* project team is already working on just this. The current project provides an important opportunity to promote sustainability in the construction industry and remind businesses of their responsibility as entrepreneurs to advance the concept of corporate social responsibility.

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Harvesting bamboo shoots

Sustainable Consumption and Production through ESD

Sustainable consumption and production is one of the key priorities of RCE Kitakyushu. Various efforts have been made to raise citizens' awareness on the issue of sustainable consumption in particular. Food, a daily necessity, is an important entry point for ESD. In Japan especially, food self-sufficiency is less than 40% and Japanese who eat imported food become aware of the realities of food production outside and within the country, as well as the journey food takes to reach their mouths.

“Local consumption of local products” is a slogan that gained popularity as one of the ways to reduce CO₂ emissions and to encourage support for the local economy. While the slogan is popular, it has not translated into satisfactory actions in the community. The term and concept of food mileage – how far food travels to get to the grocery store shelves – has also been introduced in relation to global warming, but it has not transformed people's behavior. Consumers still tend to buy food based on price considerations. In addition, changes in diet, unhealthy eating and food waste have become social and environmental problems. Children in the country know little about food production processes but there is a sense that the children need to know about food producers, production processes and the long journey food takes before it reaches the grocery stores, in order to change their diet, eating habits and their attitude toward food.

Project Activities

1) Education materials to promote ESD

Several members of the Study and Research Project Team began to develop education materials to raise awareness among citizens on sustainable consumption. The idea to focus on food came from the experience of a housewife who found that food at her local grocery store came from countries where she had never been. As a member of the Project Team, she suggested that the journey of food should be included in the education materials. The group began its work and focused special attention on local products, introducing the concept of food mileage to reduce CO₂ emissions associated with the transportation of products. While some project team members were university professors and school teachers, others were ordinary citizens driven by enthusiasm for promoting ESD in the community.

After two years, the project team had developed education materials centred on a hamburger shop called 'Future Palette'. The name Future Palette came from the nickname of the Kitakyushu ESD Council and was selected in a nationwide competition. The name symbolizes the desire to draw colorful paintings of ESD through the collaborative activities of its members. Before deciding on hamburger as the example of food, the project tried various other foods popular among Japanese kids, such as curry and rice or foods served at buffets, but they were either not practical or suitable for the purpose. Many stories were also discussed and discarded before arriving at the final copy. Division of work among the team members was important as team members created the material themselves. This became a learning process for many members. For example, a member assigned to find photos for printing on the materials needed to learn about photography credits and copyright. When a prototype for the materials was finally created, it was tested among children at community centres. Though these processes of trial and error took time, they strengthened ties among project team members. Because of their close involvement in the production of the stories, team members were quite confident when presenting the materials.

Above all, the most critical issue is how to transform knowledge to behaviors

The story itself is about a hamburger shop owner who conducts business through buying ingredients and selling products. The project team produced beautiful cards printed with hamburger ingredients, such as beef, chicken meat, prawn, egg, cheese, lettuce, tomato, onions and bread, and also created cards for money that would be used in workshops. In the workshop, the shop owner is asked to prepare ingredients to open a burger shop using the picture cards and money for shopping. After participants enjoy the simulation, they are asked to reflect on their behavior in the context of sustainability, the economy and the environment. The overall objective is to make citizens more aware of the purchasing habits and to transform this awareness into changes in behavior.

To develop the story and teaching materials Kitakyushu ESD Council provided seed funds with the team seeking funds through additional sources to conduct workshops.

2) Workshop with children with disabilities

After the teaching materials were finalised, team members conducted a number of one day workshops at schools, university classes, community centres and nursery schools. One workshop was with children with mental and physical disabilities and their guardians. This was organised by the Kitakyushu ESD Council with the financial support by F CO-OP, a local cooperative. This cooperative directly connects producers and consumers in order to provide safe food to consumers and build a friendly relationship between them. The partner organisations in this event were: community-based NGOs working for children with disabilities; an NGO promoting environmental education with cloth picture theatre; the owner of a bamboo shoot farm; and university students. About 40 people, including 22 children with disabilities and 20 staff members took part.

The project provided opportunities to the children with disabilities and their families to learn about sustainable production and consumption throughout the entire production process, from harvesting ingredients like bamboo shoots – a well known high quality product of Kitakyushu – at a farm, to cooking hamburgers, eating, cleaning up and disposing of waste. For cooking hamburgers, locally-grown bamboo shoots as well as ingredients imported from around the world were used for learning. The workshop programme consisted of three interactive parts: harvesting bamboo shoots at a farm, cooking hamburger in a kitchen and participating in a workshop in a seminar room.

3) 'Cloth Picture Theatre'

Education material called 'Cloth Picture Theatre' was originally developed by an NGO called Kitakyushu Interpretation Study Group, which is a member NGO of the Kitakyushu ESD Council. It encourages further participation of children in various environmental activities. The learning materials are all made of cloth, so children can enjoy touching and playing with all the material. One popular cloth picture developed by the group is a cap that imitates the shape of the head of a particular type of migrant bird. By changing different colors of the caps, children learn about the changing head colour of the birds, which indicates the timing of their migration to the North. Children play with the caps as if they were migrant birds. Some cloth pictures, such as a sea and the earth, were displayed so that children could touch the pictures.

Touching is important for children because touch reinforces the things children see and hear and more of the material is learned and remembered.



For the hamburger shop material, a new set of cloth pictures were developed by the group in collaboration with the project team. The cloth pictures were of hamburgers, meat and green lettuce leaves. These pictures were used to show the ingredients of hamburger and to explain global warming.

During the one day hamburger shop workshop conducted for children with disabilities, the cloth materials were used at the very end of a programme when an Eco Doctor appeared. The Eco Doctor is a character played by a member of the project team to help participants reflect on their behaviour as a hamburger shop owner and to provide information about food mileage. With the support of the Eco Doctor, the participants learned ingredients for hamburgers consumed in Japan come from around the world. For example, wheat, tomato and chicken often come from the United States of America; beef often comes from Australia; cheese from New Zealand; fish from Norway and China; lettuce from Taiwan; and shrimp from Vietnam. The Eco Doctor reiterates the fact that hamburgers are often made using imported ingredients with substantial food mileage and CO2 emissions. This helped the children understand that eating local products was environmentally desirable.

Collaborative work

One important element to highlight beyond the outcomes of the project activities was the importance of collaboration with partners. The implementation of these workshops was only possible due to strong collaboration and partnership.

RCE Graz-Styria: Influencing Sustainable Consumption and Production in Styria

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RCE Graz-Styria

Graz is the second largest city in Austria with 260,000 inhabitants (2011). It is the capital of the federal state of Styria (1.2 million inhabitants in 2011) and acts as its economic and political centre. The geography of Styria and its economy are very diverse. Styria is characterised by old industrial, mining and rural areas affected by migration and unemployment, and by regions prospering from the automotive industry, tourism, and the effects of central urban areas like the city of Graz.

Graz has a traditional industrial history in mechanical engineering, machinery and vehicles. Internationally recognised companies, research institutions, knowledge suppliers (including four universities) and special services are located in the urban area. Income levels are higher and labour market indicators show a better performance on average than that of Austria or the European Union. Since 1997, more than a hundred villages have participated in local and regional Agenda 21 programmes, which have focused on promoting regional supply services, business potential, and on raising the consciousness and local identity of the population.

In the future, the political programme aims at strengthening public transport, developing environmentally friendly solutions for commuters, positioning the city of Graz as a City of Human Rights and City of Design (as it has been designated by UNESCO), as well as strengthening its position as an international location for science. As part of the worldwide network of Regional Centres of Expertise on Education for Sustainable Development, RCE Graz-Styria, together with its regional partners, engages in formal, non-formal and informal education. Based at the University of Graz, RCE Graz-Styria has advanced its position as a driving force for sustainable development in the whole region of Styria since its foundation in 2007.

The University of Graz is the biggest employer in the region and, with more than 30,000 students, it is one of the major consumers of goods and services

Project Overview and Achievements

Sustainability4U is an inter-university committee consisting of a team of three representatives from each of the four universities in the city of Graz, including members from RCE Graz-Styria. This team meets regularly and has the strong support of the universities' rectors. The objective of Sustainability4U is to develop ideas for joint projects or adapt already existing initiatives by lifting them to an inter-university level. In doing so, it enhances new ideas by involving all universities at an equal level and thus fosters democratic and inclusive participation. Among its activities to date, two important initiatives have emerged. One is "UniMobil_4U" which aims to improve bicycle routes between the four universities, thereby integrating students and staff, while taking into account and incorporating their feedback and experiences. A second project is an annual lecture series that is focused on current sustainability issues and challenges.

Project Context and Background

The University of Graz is the biggest employer in the region and, with more than 30,000 students, it is one of the major consumers of goods and services. There have been several advances in moving towards sustainable development since the early 1990s. One of the first milestones was the development of a study on Environmental System Sciences. Further milestones included: the participation in the ECOPROFIT project ("Ecological Project for Integrated Environmental Techniques"); the foundation of the student organisation "oikos Graz" in 2002 that encouraged students' work in the area of sustainable economics and management; the publication of the first sustainability report of an Austrian university in 2006; and facilitation in the establishment of the first Austrian RCE in 2007.

Despite all of these actions, sustainable development still needs to be reinforced through communication for sustainability between universities and society at large. Fostering such engagement while, at the same time, bringing the city of Graz closer to rural areas has become the main goal of RCE Graz-Styria. In particular, non-formal education was recognised as holding the potential to engage a larger community into learning for sustainability.

Actions in the past have been carried out by university staff members and members of student organisations, but the outreach and impact of these programmes was not as big

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as required by the priorities of the region. As a result, the RCE agreed on the development of more sustainability-related actions inside and outside the university. Topics such as sustainable consumption and production were endorsed in communications with students and staff, and such topics also became the focus of activities with regional stakeholders. Sustainability4U became a flagship project providing a more collaborative and co-creative solution to partnership towards more sustainable actions.

The University of Graz as Regional Actor

The University of Graz is well aware of its role as an educator – especially for the younger generation – and its ability to raise awareness on topics such as sustainable consumption and production. Raising awareness and helping people act consciously and more sustainably is a major goal of RCE Graz-Styria. This is the reason why a cooperative structure between the four universities in the city of Graz (the University of Graz, the University of Technology Graz, the Medical University Graz, and the University of Music and Performing Arts Graz) was advanced by RCE Graz-Styria. The cooperative initiative Sustainability4U was finally launched in 2009. Together, the universities collectively address 40,000 students and 11,000 staff members. RCE Graz-Styria considers this joint initiative a good way to live up to its vision. It increases the range of influence of university sustainability activities that aim not only at students but also at society as a whole.

Sustainability4U

Sustainability4U communicates a sustainability message by presenting joint initiatives among institutions that are usually perceived as separate. Besides this important signal to the community, the projects that Sustainability4U initiates positively influence and affect the educational, scientific, and social activities of the four universities thus leading to a more holistic perception by all of its stakeholders.

Sustainability4U projects use synergies among the four universities to gain results that are valuable especially for students; however, the needs of the whole society are also integrated and addressed. It is therefore considered important to gather feedback by the people affected by the projects in order to be able to observe outcomes and make improvements. The website of Sustainability4U (www.sustainability4u.at) communicates activities to the public and provides an email address for feedback.

Comments and feedback obtained through the website are discussed at the coordination meetings. Furthermore, a team of 12 persons located at the four universities collects information at their institutes, including, amongst others, Department of Geography and Regional Sciences and Institute of Process and Particle Engineering. For the “UniMobil_4U” project a survey was carried out among students and staff in order to gain relevant data (e.g. modes of mobility, use of bicycle tracks, etc.) for improving actions towards more sustainable consumption and production in the mobility sector of students and staff. This project aims to improve bicycle routes and pathways between the four universities in Graz thereby integrating the needs of students and staff, and taking into account their feedback and experiences. On the basis of the analysis, a map was designed presenting roads, bicycle tracks and traffic signs that need to be adapted and necessary improvements were discussed with regional political decision makers. At this point, limitations and the need for regional cooperation become evident: without funding and close cooperation with regional administration and political representatives, research results cannot be sufficiently implemented. Nevertheless clear signals are made and the realisation of the main concerns of the study might be implemented in the near future in cooperation with the responsible organisations and persons.

A second Sustainability4U project is an annual lecture series, which took place for a third time in 2012. The lectures are held every week in the semester period from March to June and focus on current issues and challenges in sustainability. The series attracts students from all four universities and from the wider society. Presentations are held by experts with a multidisciplinary background from the four universities, as well as regional politicians and entrepreneurs who provide insights through their expertise in sustainability-related topics. These topics relate to current trends such as crises in education, economy and the environment. They have, so far, included social banking, fair-trade, sustainable energy and health care and many others, guaranteeing a wide range of possible fields of action for the stakeholders.

This lecture series convincingly shows how to combine resources of different institutions to build more significant collective influence. While organisational work is sometimes considerable, results demonstrate that a lifelong learning approach addressing students and the society is appropriate for furthering the sustainability goals of all four universities.

The lecture series shows how universities may contribute to sustainable consumption and production by joining forces, connecting disciplines and getting into dialogue with students, society, business and policy. The unique sustainability-related dialogue brought together not only students from various backgrounds but also generations of decision-makers, and representatives of research and practice, encouraging them to seek better consumption and production practices.



Conclusion

Sustainable consumption and production are inherent in various activities advanced by RCE Graz-Styria, sometimes in a rather subtle way. This subtlety refers to the role of RCE Graz-Styria in making use of not only formal education at the university level but also non-formal learning. Through intergenerational and lifelong learning, in the form of workshops and lectures, as well as informal learning, RCE Graz-Styria engages higher education and the broad variety of stakeholders in addressing one of the challenging topics.

The diverse educational audiences sometimes lead to difficulty in measuring results. Most activities are based on the assumption that people change their behavior towards more sustainable ways of living in each area of their life. According to RCE Graz-Styria's experience the initiative of Sustainability4U is a step in the right direction and, according to participant feedback, creates a positive impact, even though one cannot necessarily quantify its significance.

Seen from a university perspective an initiative such as Sustainability4U needs to be a part of a bundle of activities that engage people in sustainability-related activities. Among other things, it means that universities have to "live" sustainability and practice sustainable consumption and production on a daily basis. The credibility of a university's actions can attract not only students and staff but the whole region, given the broad reach universities have in terms of consumption and production.

Sustainability4U is a collaborative initiative that may be applicable to other regions and RCEs worldwide, particularly where higher education institutions are located close to each other.

The objective of Sustainability4U is to develop ideas for joint projects or adapt already existing initiatives by lifting them to an inter-university level

RCE Saskatchewan: Advancing Sustainable Livelihoods Through Equipment-Centred Learning and Sharing

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RCE Saskatchewan

RCE Saskatchewan is situated in the prairie region of Western Canada. It encompasses the province of Saskatchewan's two major cities, Regina (the provincial capital) and Saskatoon, as well as smaller communities within the corridor between these two cities (including the town of Craik) and communities to the north-east (including Nipawin and Melfort). Saskatchewan has a culturally diverse population with a substantial indigenous and métis population, historic immigration from western and eastern Europe in the 19th and 20th century, and currently high rates of immigration from across the globe. RCE Saskatchewan initially identified a number of sustainable development priorities for the region. These included sustainable community planning, addressing climate change, adapting cultures for sustainability, farming and local food production, advancing health and healthy lifestyles, reconnecting to natural prairie ecosystems, and developing sustainable infrastructure (including water and energy; see RCE Saskatchewan, 2012, Project Inventory). These were identified through the participation of its founding partner organisations. RCE Saskatchewan partners include eight higher education organisations: two provincial universities, one aboriginal university, one provincial technical institute, two faith-sponsored colleges, and two regional colleges (RCE Saskatchewan, 2012, Partners). The RCE has received government support from provincial ministries (including ministries of the environment and education), the national Ministry of Environment, and cities and towns in the region. In addition, key partners include existing and emerging sub-regional community partnerships for sustainability (for example, CSLP, 2012). Specific RCE events, such as the RCE's annual Education for Sustainable Development (ESD) Recognition Event, consistently receive support from cooperatives, state enterprises, professional associations, and environmental NGOs (RCE Saskatchewan, 2012, Recognition). The RCE is also engaging the non-formal education sector, particularly the business community, hosting a Sustainability and Education Academy seminar for senior executives in collaboration with Professor Charles Hopkins and York University (SEdA, 2012).

Project Overview and Achievements

A central concern framing the issues of focus for the RCE is sustainable livelihoods. The region continues to export raw resources with minimal value added production. Saskatchewan is resource rich: a major exporter of wheat and other grains along with oil, uranium, potash, and other minerals. Due to global demand, the provincial economy is booming despite economic hardship in other parts of Canada. This resource boom presents its own challenges; much of the development in rural areas is tied to extraction of non-renewable resources and the need to cope with their disruptive ecological impacts and lack of long term sustainability. This is despite an abundance of renewable energy sources in Saskatchewan (e.g. wind and solar), alternative production inputs tied to a prairie ecosystem, and an available land base for experimentation with sustainable production systems. With the economic boom, population growth is also occurring in larger urban centres. This has created acute problems in the area of housing, with lack of affordability, low vacancy rates, and new housing construction generally lacking sustainable design features found elsewhere. Though some light manufacturing exists, many industries serve traditional resource sectors while most consumer durables are imported.

A central concern framing the issues of focus for the RCE is sustainable livelihoods. The region continues to export raw resources with minimal value added production

Partners of RCE Saskatchewan are developing two initiatives that will help address the current context of development in Saskatchewan. The first project, under the direction of the University of Regina, has involved intra- and inter-organisational planning to install a vertical axis wind turbine (VAWT) on the University of Regina campus for both energy generation and educational purposes. The VAWT has now been installed and the University is near completion of a web based dashboard to share data from the VAWT for use in diverse educational settings. The second initiative is a collaboration of higher education partners of RCE Saskatchewan (including Luther



View of the Arm River from Craik Eco-Centre

College, the University of Regina, and the University of Saskatchewan) with the town of Craik to enable sharing of productive capital (such as machines, vehicles, and buildings) within the Craik community. To date, this project has involved identification of specific types of equipment to be shared, free/open source software programmes potentially available for enabling this sharing, and specification of software features to enable equipment to “volunteer” for projects. Underlying this concept of volunteerism is a reconceptualisation of “equipment as citizen” with this new ethical valuation to be supported by the software. In both the wind turbine project and the sharing productive capital project, educational strategies are being developed centred on the pieces of equipment themselves while presupposing diverse educational audiences.

Project Context and Background

The context of production and consumption in Saskatchewan can be partly characterised by a historic lack of a manufacturing base for final goods consumed by consumers. This can be tied to several regional features including Saskatchewan’s sparse and geographically dispersed population, high transportation costs as a

landlocked province with significant distances to navigable waterways and sea ports, economic costs associated with extreme temperature conditions (with an average high of 26 degrees celsius in Regina in July and an average January low of -22 degrees), and inherent weather risks associated with an agricultural economy.

At the same time, this lack of traditional development has meant significant innovation in other sectors to manage economic risks including a large cooperative and credit union sector, citizen-owned state enterprises (including telephone, power, and insurance crown corporations), and a non-profit sector (with Saskatchewan boasting some of the highest rates of volunteerism in Canada and the world). A further challenge relates to a skills gap between the existing labour force – especially young people and indigenous youth – and the relatively high technology jobs that are available in growing resource sectors of the economy. Strategic community interventions that enable the laddering of individuals into the workforce (possibly through the use of intermediate technologies) and beyond traditional glass ceilings are critical. This is potentially achieved with community innovation and experimentation with sustainable and appropriate technologies.



Vertical Axis Wind Turbine Installed at the University of Regina

RCE Saskatchewan Initiatives addressing this Context

RCE Saskatchewan has sought to advance projects that provide place-based and object-centred learning opportunities to advance sustainable production and consumption. These include developing regional laboratory centres for sustainability (focusing initially on wind energy) and developing community spaces and technology for sharing productive capital. The first project entitled “Re-engineering Research and Learning for Sustainability” has involved experimenting with small scale wind power generation in an urban rooftop setting. The University of Regina, a founding partner of RCE Saskatchewan, has made a strategic commitment to sustainability as part of its strategic plan “mâdawohkamâtowin: Our Work, Our People, Our Communities” (University of Regina, 2009:4). Appropriately for the kind of collaborative work required for sustainability, the Cree word mâdawohkamâtowin means “co-operation; working together towards common goals”. University of Regina researchers across disciplines (including the faculties of engineering and education) worked with the University’s Institute of Energy, Environment and Sustainable Communities and its Physical Plant to install a vertical axis wind turbine (VAWT) in the research park of the University. The turbine is a 3.5 kW hour Cleanfield Vertical Axis Wind Turbine. The VAWT is connected to the provincial power grid through net metering, in cooperation with the provincially owned power company, SaskPower. The installation of the turbine is meant, at one level, to practically examine the use of this type of wind turbine manufactured by Cleanfield Energy of Ontario within a prairie setting (see Cleanfield Energy, 2012). The installation allows examination of the correlation of produced energy in light of local atmospheric conditions (such as wind direction and speed, humidity, and pressure) along with impacts of extreme temperatures. This data will also be helpful in examining optimal locations for such wind turbines on the prairies.

Other educational goals are also associated with the project. The University of Regina is creating a webpage “dashboard” that will allow for public access to the data collected from the wind turbine. The dashboard will show real-time power generation in relation to wind speed and direction, along with weekly and monthly averages.

The data will not only be available to the general public but is specifically intended for use by Kindergarten to Grade 12 teachers working on environmental sustainability issues and renewable energy. The data will also be made available to undergraduate and graduate students at the University. This will include the University’s Faculty of Education. Undergraduate education students can consider interdisciplinary curriculum development tied to the place-based data provided by this wind turbine (and other such projects developed in the province) to support the sustainability emphasis of the province’s education curriculum. In addition, the data will be available to other RCE partners working in the area of wind energy on the prairies. This includes the Saskatchewan Institute of Applied Science and Technology that has also been examining small wind turbine technology (with a 1.3 kW turbine) in the nearby city of Moose Jaw (Thompson, 2009).

The second project, entitled the “Sharing Productive Capital Project (SPCP)”, is attempting to enhance existing free/open source software with the aim of enabling the sharing of equipment, vehicles, and buildings within the town of Craik, a small community in Saskatchewan. Craik has been a leader in sustainability innovation in the province. This includes its having developed an eco-village and straw bale eco-centre (CSLP, 2012).

In working with the Craik Sustainable Living Project, a founding partner of RCE Saskatchewan, it was found that there were a number of opportunities for sharing underutilised equipment within the community. Given the success of volunteerism within the community of Craik in advancing sustainability initiatives, a key question was whether the equipment available for sharing could be understood through the design of the proposed software as “volunteering” to advance specific projects. Mobilising equipment through volunteerism, however, requires seeing physical capital as analogous to autonomous decision-makers with the ability to choose their own courses of action, namely as citizens. The overarching goal of the Sharing Productive Capital Project, then, has become exploring how productive capacity and sustainability might be advanced by applying concepts related to citizenship to the treatment of underutilised productive capital.

A reconceptualisation of machines in terms of the idea of citizenship and, more specifically, autonomy or self-governance, draws on areas of the humanities, especially ethics and political philosophy. With funds from Luther College, a founding partner of RCE Saskatchewan, an initial literature review of philosophy related to the ethical treatment of machines and other human artifacts was conducted. Several findings emerged in thinking about how one might “liberate” currently owned productive equipment. In this light it would be seen, analogous to citizens, as having intrinsic value, thereby enjoying various rights and freedoms. For example, the “freedom from interference by others” when applied to machines requires software that mobilises machines in a way that optimises their community use, rather than having their use arbitrarily restricted by a traditional equipment owner. Software can also enable equipment to “freely associate” with other pieces of equipment in a community’s repository to achieve a much greater set of production possibilities. The “quantity and quality of choices” open to machines can also be enhanced by having software that allows users to identify and tag existing uses for a piece of equipment within a given setting, as well as identifying new uses. These diverse uses can then be actively promoted to the community. One can also view equipment, analogous to citizens, as wanting to act on “higher-order life plans”. This requires software design that enables equipment time to be dedicated to higher-order, longer term community projects, particularly where there are conflicting demands on use. Finally, for humans to effectively exercise citizenship this requires certain underlying material conditions to be met, such as food, shelter, and health. Within the context of equipment treated as citizens, this might require ensuring a sustainable supply of energy (i.e. food), tracking the equipment’s current location and proper storage (i.e. shelter), and developing proper maintenance schedules (i.e. health).

Following this literature review, free/open source software applications that might be adapted to suit the project’s goals were identified including collection management software, library management software, and volunteer management software (for example, Tellico, Alexandria, LibLime, Evergreen, Koha, CiviCRM, and Son of Service). Meetings were then held in Craik to discuss current ways of sharing within the community and needed software

functionalities to enhance this sharing. Following this consultation, the Craik community identified five types of productive assets to share initially. These included: equipment for ecologically friendly construction (for example, straw bale housing); gardening equipment; specialised tools (e.g. masonry equipment and power tools presentation equipment for workshops; and outdoor education equipment. In seeking to build and implement the software, the SPCP project seeks to use scenario-based design, a prominent method used in computer science. As such, the community of Craik developed five scenarios for the software’s potential use based on their experiences with each type of equipment. The community also identified priorities for software functionalities. Initial specifications for the development of the software were then undertaken.

In 2011, a community of researchers from a variety of disciplines (philosophy, computer science, education, and religious studies) and several RCE Saskatchewan partners (including the University of Saskatchewan, University of Regina, and Luther College) formulated a proposal to the Social Sciences and Humanities Research Council of Canada (SSHRC) to advance the project. The proposal was to initially develop a community inventory of equipment in Craik in the five areas identified, along with implementing a free software prototype developed by graduate students and customised for the community of Craik. The proposal also included participation by other RCEs interested in sharing productive capital in their respective regions, specifically RCE Kano in Nigeria. Unfortunately, this interdisciplinary project proposal was not funded by SSHRC. The respective RCE partners are currently examining how the project might be funded by another partner of the RCE and/or advanced by mobilising in-kind voluntary contributions. In addition, computer science students at the University of Regina (undergraduate and/or graduate) have also assisted to further the software’s development as part of a directed reading course during the summer of 2012.

Conclusion

Both projects illustrate the need for collaborative, interdisciplinary partnerships to have the critical mass of resources and expertise to advance place-based and object-centred learning. Additional educational opportunities become possible upon implementation of

the project given its transformative impacts within a given community. Knowledge formation and skill development will naturally follow these opportunities for situated experiential learning. At the same time, the projects each need to address multiple educational audiences and achieve clear developmental milestones to ensure ongoing engagement by project partners. Both projects also show the need for transformative education at the level of values. Each requires re-envisioning the ethical status of the physical equipment being studied. In the case of the sharing productive capital project, the innovative application of concepts associated with citizenship to non-human equipment provides for a wide range of educational possibilities. These creatively build on an existing platform of complex ideas associated with various rights and freedoms held by a country's citizenry yet applied to a novel context – that of equipment. Building on such a platform will hopefully allow for a more rapid engagement and advancement of learning. The potential for rapid innovation by applying existing ideas to a novel context should not be underestimated nor should it be surprising to those engaged in the field of sustainable development. In the case of sustainable development, the application of the concept of “capital” (traditionally applied to machines and money) when applied to sustaining human beings and natural objects (as human capital and natural capital respectively) is a foundation of sustainable development. This sustainability discourse has had a remarkably transformative impact. Seeing machines as citizens may be likewise transformative.

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RCE Greater Phnom Penh: Promoting Sustainable Rural Development in Greater Phnom Penh

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RCE Greater Phnom Penh

RCE Greater Phnom Penh (RCE GPP) was officially acknowledged by UNU-IAS in 2009. It works in Phnom Penh, Cambodia and its six surrounding provinces. Activities focus on promoting education for sustainable development (ESD) in Greater Phnom Penh, specifically in regard to food, agriculture and environmental education. The RCE is a network of partners, which include the Royal University of Agriculture (RUA) and Institute of Environment Conservation and Rehabilitation, the Ministry of Agriculture, Forestry and Fisheries, the Ministry of Rural Development, the Ministry of Education, Youth and Sports, several elementary schools in Phnom Penh and Kampong Cham, and Cambodia Branch (ERECOM CaM), which also serves as the coordinator of the RCE in the Secretariat Committee. Tokyo University of Agriculture, the Institute of Environment Conservation and Rehabilitation, and the Association of Environmental and Rural Development also serve on an external advisory panel of the RCE.

Context and Project Activities

The economy in Greater Phnom Penh is based on agriculture, an important sector in the Cambodian national economy. More than 70% of the total population in Greater Phnom Penh is engaged in the agricultural sector and depends on agriculture – such as livestock raising, fisheries or aquaculture – for their livelihoods. Rapid development of agricultural technologies in Greater Phnom Penh has significantly increased agricultural production since 1990. However the majority of farmers apply agricultural chemicals, such as synthetic fertilizers, herbicides or pesticides. Agricultural chemicals released from farmlands downstream cause various environmental and health problems. The overuse of chemicals is also damaging soil productivity.

In Cambodia, attention has been paid to education for sustainable development (ESD) in the agricultural sector for achieving food safety as well as for environmental conservation. RCE GPP has been focusing on local farmers, as well as students in the elementary schools who would become farmers in the future. In doing so, one can expect an increase in opportunities to build

public awareness around the importance of bringing harmony between agricultural development and natural environment conservation. When RCE GPP was first introduced in Cambodia it faced a number of regional challenges. The first was the need to enhance education on food, agriculture and the environment for elementary schools; the second was the need to facilitate sustainable agriculture for local farmers; and the third was the need to promote sericulture to deepen environmental awareness and income generation for local farmers.

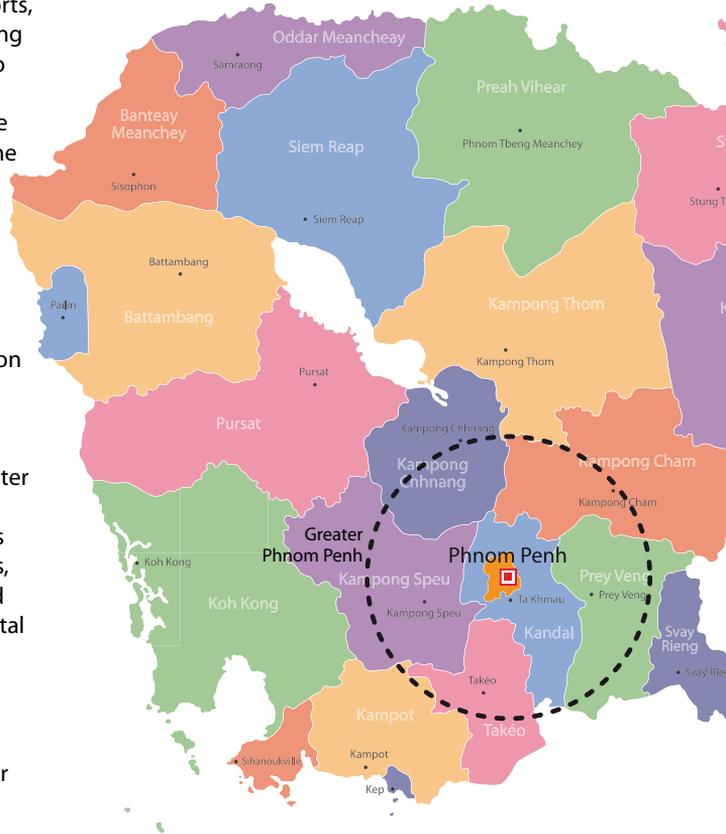


Fig 1. Location of Phnom Penh and Greater Phnom Penh

Target Area

Phnom Penh is the capital of Cambodia and currently has more than 1.3 million inhabitants. Covering an area of 290 square kilometres, it is located in the south-central region of Cambodia at the confluence of the Tonle Sap, Mekong and Basac Rivers. These rivers provide freshwater and other resources to the region. As shown in Fig. 1, Greater Phnom Penh covers not only Phnom Penh but also its surrounding provinces, Kampong Cham, Kampong Chhnang, Kampong Speu, Kandal, Prey Veng and Takeo. The area and population of each province are summarised in Table 1. These provinces are closely linked to Phnom Penh in terms of the demand and supply of food and the local economies. Greater Phnom Penh covers 34,641 km² and has a population of 7,250,881. In the provinces, more than 90% of the population lives in rural areas, while in Phnom Penh 93% of the population lives in an urban area.

Table 1 Phnom Penh and surrounding provinces in Greater Phnom Penh

Name of province	Area (Square km)	Population
1 Phnom Penh (Capital)	290	1,325,681
2 Kampong Cham	9,799	1,680,694
3 Kampong Chhnang	5,521	471,616
4 Kampong Speu	7,017	716,517
5 Kandal	3,568	1,265,085
6 Prey Vang	4,883	947,357
7 Takeo	3,563	843,931
Total	34,641	7,250,881

Regional Challenges

Enhancing education on food, agriculture and the environment in elementary schools

Although education is key to developing human resources, it is not always easy to improve the education system, because of a lack of teachers, inadequate school facilities and the low income of families of those enrolled. In Phnom Penh the net admission ratio for elementary school is 93.3%, declining to 34.8% in lower secondary school and 14.8% in higher secondary school (MoEYS 2007/2008). Female students from rural areas or students from poor families are all grossly underrepresented in education statistics. A large number of students who do not continue to secondary schools start working in the agricultural sector instead.

In the provinces of Kampong Cham, Kampong Chhnang, Kampong Speu, Kandal, Prey Veng and Takeo, conditions are even worse. Parents in rural areas need their children to work the farmlands so the poverty of farmers is a barrier for children to continue their study at elementary or secondary schools.

Accordingly, RCE GPP has paid close attention to sustainable processes for rural development while addressing regional challenges in ESD. Although there are many factors constituting sustainable rural development as economic growth, it was decided that a focus on social development and environmental conservation, and education on food, agriculture and environment would be a good first step when approaching sustainable rural development in Greater Phnom Penh. Students in elementary schools were priority targets, as they would become farmers in the future.

Table 2 Outcomes from education on food, agriculture and environment education

Viewpoint	Outcome
Effectiveness	Teachers and students have learned about education for sustainable development through sustainable agriculture
Impact	Teachers and school administrators see the benefit of the activities
Sustainability	Teachers, in particular, and students integrate sustainable agriculture in school curriculum



Fig 2. Education on food, agriculture and environment in RCE Greater Phnom Penh

Since 2006, education on food, agriculture and the environment has been enhanced by the collaborative efforts of government organisations, universities, local NGOs, local communities, and elementary schools in Phnom Penh and Kampong Cham. Joint activities undertaken include: the creation of a model for enhancing education on food, agriculture and environment for elementary schools in Phnom Penh and Kampong Cham through seminars and hands on practice in organic school gardens; publishing and distributing various textbooks or guidebooks written in Khmer; conducting teacher training for greater learning on education on food, agriculture and environment. The outcomes of these efforts are shown in Table 2. As students and teachers in particular integrate sustainable agriculture in school curricula, the partners expect a high degree of sustainability of these activities.

Facilitating sustainable agriculture for local farmers

Facilitating sustainable agriculture for farmers based on natural resource circulation in Kampong Cham is another challenge. The target area for these efforts is Samroung commune of Prey Chhor district in Kampong Cham. Samroung commune is made up of 11 villages, with a total population of 8,111 and 1,714 households. The period of activity for this initiative runs from April 2011 to March 2016. Table 2 shows the activities that were implemented up to March 2012.

There are three expected outcomes of this initiative:

- A. Farmers' groups will be formed by local farmers and a pellet compost centre will be set up in the commune. It is expected that at least 25% of all households in the commune promote sustainable agriculture based on natural resource circulation, where half of all agricultural chemicals are substituted with organic materials.
- B. Sustainable agriculture based on natural resource circulation is enhanced and more agricultural products with low chemical input are available on the market. Low-chemical products are expected to be sold at the market at least two days per week.
- C. Agricultural education becomes a part of life skill education and networking for promoting sustainable agriculture is promoted. School teachers are expected to acquire teaching skills for education on food,

agriculture and environment and to continue such classes in all schools in the Sro Nge school cluster. Networking is expected to promote sustainable agriculture based on natural resource circulation in the whole Kampong Cham province.

In 2012, a new activity on 'Establishing and managing a pellet compost centre' was added to existing activities. RCE activities are closely connected with government policy regarding greening agriculture and the real needs of increasing agricultural productivity, while achieving clean and green practices. The activities are also developed with the increasing population in mind and in full support of government strategy.

Table 3 Activities for facilitating sustainable agriculture in RCE Greater Phnom Penh

Main activity	Content
Setting conditions for activities	Through baseline survey and annual evaluation, activity contents are reviewed and modified
Forming farmers' groups and promoting sustainable agriculture based on natural resource circulation	Farmers' groups are formed and sustainable agriculture based on natural resource circulation with low chemical input is implemented
Promoting the distribution and sales of products with low chemical input	Through improving the distribution of products with low chemical input, local farmers who sell the products increase within the area
Strengthening network for promoting sustainable agriculture based on natural resource circulation	The network in Cambodia is strengthened through the meetings on activity evaluation and the publication of newsletters



Fig 3. Sustainable farming practices in RCE Greater Phnom Penh

Table 4 Outcomes from facilitating sustainable agriculture in RCE Greater Phnom Penh

Viewpoint	Outcome
Relevant	There are strong linkages between sustainable farming and sustainable livelihood
Effectiveness	The numbers of key farms and farmers, along with the products with organic fertilizer and low chemical input are likely to be achieved as planned by the end of the activity term
Impact	The activity shows concrete and tangible benefits to the farmers
Sustainability	Farmers have learned from the activity and are planning to continue the system even after the activity term completes, as they are very satisfied with the experience they gained

Promoting sericulture for deepening environmental awareness and income generation

The Eri silkworm, *Samia Cynthia ricini* (Fig. 4), is a wild silkworm found in south Asia and originating from the Assam province in India. Outside of India, Eri-culture has been practiced in various countries, such as Thailand, Vietnam, China, the Philippines, Nepal, Ethiopia and Cambodia. There are more than 20 varieties of wild silkworms worldwide, each with a unique set of characteristics. The Eri silkworm along with some other kinds of wild silkworms have a unique cocoon characteristic, called a ‘nano-tube structure’ (Akai and Nagashima, 2001/2002). This nano-tube structure is a material that has a number of unique features, such as high ultraviolet protection and high moisture absorption. The material can be used as hybrid yarn, along with other materials like mulberry silk and cotton. The Eri fibers are very soft, like wool or cashmere, and this is part of the reason why Eri silkworms have caught the attention of the private sector around the world.

The Eri silkworm is multivoltine, hatching around six times per year (Kawabe, 2010). One lifecycle is about 45 to 50 days. One female moth produces more than 200 eggs each time. Host plants include leaves of castor (*Ricinus communis*), cassava (*Manihot esculenta*), papaya, and a few other kinds of leaves which can be found in rural areas of south Asia. Those leaves grow naturally in that region, especially near rivers and damp sites. Because of this, farmers can easily start Eri-culture, a kind of sericulture



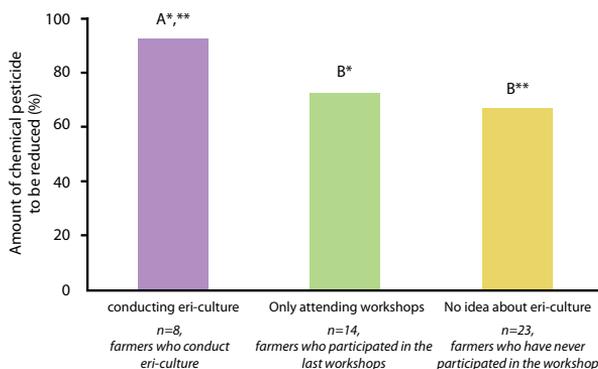
Fig 4. Eri silkworm, castor leaves as host plant and cocoon of Eri silkworm

with the Eri silkworm, without changing their land use. While using the natural resources in villages in this manner, farmers gradually change their farming practices towards more sustainable agriculture activities. For example, due to the sensitivity of the Eri silkworm to any kind of chemical substances, farmers learn the dangers of pesticides, cigarette smoke, smokes from burning plastics and other chemical and environmental hazards. The farmers need to stop the use of chemical substances or at least reduce the amount of usage in order to ensure their Eri-culture thrives. Thus Eri-culture could be one of the educational materials for sustainable rural development and also a solution to reduce chemical use.

However, to promote sustainable agriculture on ESD, it is necessary to provide something as incentive for local farmers, as their poverty level is quite high and they are eager to earn supplementary income, especially during the dry season. Farmers often go to urban areas to look for work so it is important not only to provide workshops or seminars regarding sustainable rural development but also to provide an opportunity for income generation in order to motivate farmers towards those ends.

Since October 2010, RCE GPP has introduced the Eri silkworm to local villages in Kampong Cham province as part of their activities. Training and demonstration workshops on Eri-culture have been conducted. After six months, a survey was conducted to evaluate the effects of Eri-culture on the environmental awareness of local farmers.

Fig 5. Difference in expected percentage of pesticide to be reduced between adopters and others



The results of the survey showed that local farmers who bred Eri silkworms wanted to reduce 92.5% of pesticides, compared to conventional use. Local farmers who participated in the workshop alone or who did not attend the workshop wanted only a 72.3% or 66.9% pesticide reduction, respectively (Kawabe et al., 2012). This shows how Eri-culture can have an educational function for local farmers regarding the reduction in the use of pesticides. However, other trainings such as sustainable farming practices may be indispensable to reduce the amounts of pesticide used to minimize the insect damage to agricultural products.

Conclusion

RCE GPP's work has focused on dealing with these three regional challenges: enhancing education on food, agriculture and environment for elementary schools; facilitating sustainable agriculture for local farmers; and promoting sericulture to deepen environmental awareness and income generation for local farmers. The various collaborative activities undertaken by the RCE GPP network of governments, universities, local NGOs, local communities, elementary schools and the private sector will help advance sustainable development in Greater Phnom Penh. These RCE activities are also significant in that they address government policy regarding greening agriculture and the real needs of increasing agricultural productivity, while achieving clean and green practices. The activities respond to the growing needs of the population, support the government strategy and are in line with the global vision of sustainable production and consumption and the three pillars of sustainability – economic, environmental, and social.



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RCE London: A Ring around the Park – Developing a network of environmental and community groups around the Olympic Park

Neil Herrington

The London RCE

Established in 2010, the London Regional Centre of Expertise on Education for Sustainable Development (London RCE) is transforming education by developing the capacity of Londoners to learn together to make London a more sustainable and inclusive place to live, work and play. It does this by providing a forum, by means of dialogue and action, through which communities can be empowered and make their voices heard, building on the diversity of London to help shape and influence global excellence in education for sustainable development (ESD) through innovation in learning.

The London RCE provides a focus for research in transformative education for ESD, sharing and disseminating the learning of the London RCE with national, regional and international networks in a mutually supportive manner.

The London RCE operates through dynamic and fluid networks, which are made up of schools, community groups, volunteer groups, the business sector, universities, non-governmental organisations (NGOs), local authorities and other interested individuals. Its current projects include:

- The Higher Education for Education for Sustainable Development Network – Embedding sustainable development in higher education curricula and taking the initiative to lower the carbon footprint of universities and academics;
- The Place-Based Learning Network – Promoting and undertaking research and action focused on schools and communities;
- The London Regional Education for Sustainable Education/Global Citizenship Network – A teachers' network involved in research with universities to support education for sustainable development throughout London's education providers; and
- ESD for Business – A grouping of organisations interested in business success through using ESD in their business plans.

This chapter details the initial development of a new project network for organisations engaged in environmental and community activities in the boroughs that surround the London Olympic Park, a new sporting complex that was constructed for the 2012 London Games.



Workshop participants on the balcony of the View Tube overlooking the Olympic Park

Project Context and Background

Developing the Network

In looking to develop such a network, the London RCE was keen to explore possible synergies between the various groups and the ways in which future connections could be made and the network extended. In addition, the RCE was looking for any opportunities that might be generated by developments associated with the 2012 Games, especially in the legacy phase of the Olympiad.

In developing the idea for such a network the London RCE was aware that, for a few weeks in 2012, an unprecedented focus would fall on East London. The world would watch as athletes performed 'superhuman' feats at the Games of the 30th Olympiad. This would be the culmination of many years of work, not only for the athletes, but for those involved in securing the bid; the construction of infrastructure; and the careful stewardship of the Olympic brand, which has been London's responsibility since 2008.

There was little doubt that the Games would be a spectacle, and for the majority of the watching world this is all that they required. However, for those that had put in the work to secure and put on the Games, and for those affected indirectly by that work, the outcome needed to be more than spectacle.

This stress on the legacy aspect of the Games is indicative of the significance that the International Olympic Committee places on it and is further evidenced by its evaluation process, which is firmly focused on environmental and social outcomes. This emphasis is, at least in part, "to legitimise the huge expenditure involved in hosting the Games" (Poynter 2009).



The London RCE operates through dynamic and fluid networks made up of schools, community and voluntary groups, the business sector, universities and non-governmental organisations, local authorities and other interested individuals

London's successful bid seemed to be predicated on its urban regeneration focus. Jack Straw, then the British Foreign Secretary, said of the claims being made for the Games:

"London's bid was built on a special Olympic vision. That vision of an Olympic Games that would not only be a celebration of sport but a force for regeneration. The Games will transform one of the poorest and most deprived areas of London. They will create thousands of jobs and homes. They will offer new opportunities for business in the immediate areas and throughout London... One of the things that made the bid successful is the way in which it reaches out to all young people in two important respects: It will encourage many more to get fit and to be involved in sport and, whatever their physical prowess, to offer their services as volunteers for the Olympic cause" (Hansard 2005).

These comments, along with statements made by the Office of the Deputy Prime Minister (2006), Colomb (2007) and Poynter (2009) that sustainable social regeneration will involve changes in the public perception of an area, improvement of public services, infrastructure changes, the enhancement of public space and the reduction of social inequalities, were a starting point to explore the likely legacy and the ways in which the London RCE could work to help secure meaningful, authentic legacy for the communities most closely associated with the Olympic Park developments.

Clearly, there are critical questions to be explored about this type of event-driven regeneration of an area, the way in which corporate sponsorship is such an important part of the whole operation, and the extent by which the primacy of the Olympic Brand can override local concerns. These issues provided context to the London RCE's work but were not the focus of it. Rather the RCE focused on how its network could position itself to derive maximum benefit from the fact that the Games were happening and that the Olympic Park would exist well into the future. This offered up the possibility to connect communities and groups that had operated in what had been conceived as: *"...a geography of separation – the city has flown across its space. When talking to the boroughs and the community groups [about the Olympic Park], it became obvious that we should be growing inwards from the edges, not creating new communities in the middle. The project should be about*

repairing the rift in the city fabric and promoting the greater integration of community with what we can bring forward as an improved environment. So what we are doing is extending existing frameworks and networks into the valley, whatever we put in the valley centre will be something that is accessible to a much broader group of people." (Prior, 2007).

Defining the Issues

This project aims to work with this professed desire to extend existing networks. In addressing this aim, the London RCE initially elicited the views of local people – specifically stakeholders in local educational endeavours – about the claims that had been made concerning the benefits that may accrue from hosting the Games. This was done through the use of Q methodology (McKeown and Thomas 1988; Watts and Stenner 2005; Coogan and Herrington 2011). Essentially, Q studies explore correlations between persons or whole aspects of persons. In doing this, the methodology neither tests its participants nor imposes a priori meanings. Participants are asked to decide what is meaningful and significant from their perspective.

The study findings sensitised the RCE to some of the key points that needed to be taken into account when framing the network, as well as potential points for further investigation by the network. Those findings are detailed below.

The remodeling and development of public space linked with the remediation of toxic land - as was the case in London and the Sydney Games of 2000 - can be seen as being of major environmental benefit. However, the perceptions of the participants indicated that there were concerns about the way in which this new space would be disconnected from the local community. It is notable that, for some, the construction of the 'new' public space came at the expense of the destruction of existing public space. Interestingly this was most clearly expressed by school student participants. There is, therefore some need to further explore the link between age and the perception of public space.

Since the Sydney Games of 2000 there have been environmental protocols in place around such issues as the conservation of species and resources, pollution control and waste management. Whilst the monitoring

of such protocols through NGO scorecards, for example as happened in Sydney and Athens, offers a reputational risk, these protocols and the way in which they are enacted may be the reason why some of the participants recognised the potential for the Olympic Park to be a model for future projects in terms of sustainable development. This is seen alongside a general lack of belief that the Games will inspire people across the country to develop sustainable lifestyles. To some extent these perspectives are likely to be coloured by ambiguities about the mediating agent through which such inspiration might be derived. There is a need to define the way in which the resource offered by the Games can be utilised to deliver meaningful educational opportunities in the development of sustainability education, both formally and informally. The former category will include skills development in, for example, the maintenance of the parkland and work around sustainable energy production. The story of the Games may become a resource for educators to explore issues of planning and urban development, but in order for this to be of use from a critical point of view the story needs to include the socio-historical narrative as well as the one of regeneration. The issues around the tensions between public and private space, the engagement of communities in the planning process and the use of statute to circumvent normal regulation will all form part of the rich resource for such study.

There was general disagreement that the Games would contribute to the enhancement of the natural environment, nor are the developments around the Games perceived as giving people contact with the natural world. There will be a need to revisit these perceptions as the Park develops, as some of this could be seen as being a lack of vision as to what the Park will have to offer. This lack of belief could also be part of a bigger issue of misrecognition of urban wild space as being legitimately described as the 'natural world'.

Forming the Network

The context having been set, the London RCE proceeded to think about the formation of a network of organisations engaged in environmental and community activities in the boroughs that surround the London Olympic Park – in effect to put a ring around the Park, one that could form spokes across the Park once it is in legacy mode. Members of the existing network were able to offer a venue for the

initial meeting at the View Tube, which is a social enterprise and community venue located on The Greenway adjacent to the Olympic Park. This was thought to be an attractive and appropriate site for such a meeting. The venue attracted some 16 participants who were initially shown around the site and given a short input on the work of the London RCE and the proposed network. The substantive part of the meeting took the form of a World Cafe. There had been some fear on the RCE's part that, given that the operational area that was being proposed was quite a confined geographical area, and given that the groups were likely to broadly have the same interest, everyone would already know everyone else. If that had been the case this would simply be a meeting of old friends. This was not the case and the meeting thus could be seen as strengthening the view of the "geography of disconnect".

The story of the Games may become a resource for educators to explore issues of planning and urban development

Participants were asked to describe the work that their organisations were involved in and to consider the links that might be formed between groups. As well as introducing participants to groups of which they were previously unaware, it also offered the possibility of making contacts within organisations which might prove beneficial. This led to a number of interesting dialogues which have subsequently resulted in joint projects.

Participants were also asked to think about and identify ways in which the London RCE could support the network and add value. The key point was that the London RCE is a network of networks and as such offers access to groups and individuals who wouldn't normally be accessible. Such access might offer up complementary skills, resources and expertise. The potential to use this complementarity in the construction of research and project bids was mentioned and is being explored. The ways in which network partners can use the RCE to disseminate and raise the profile of their work was also discussed.

Next Steps

It is clear that this network has an authentic purpose and will continue to grow. Indeed, participants at the first meeting were asked to pass the word and to identify people with whom the London RCE should be in touch. It is also clear that issues around the governance of the Olympic Park will play a role in the actual form of engagement of the network with the physical space. In a sense, that doesn't matter as the network isn't dependent on the space to exist, but it would be good if it could have an impact on forging the linkages across the Park and into the communities beyond.

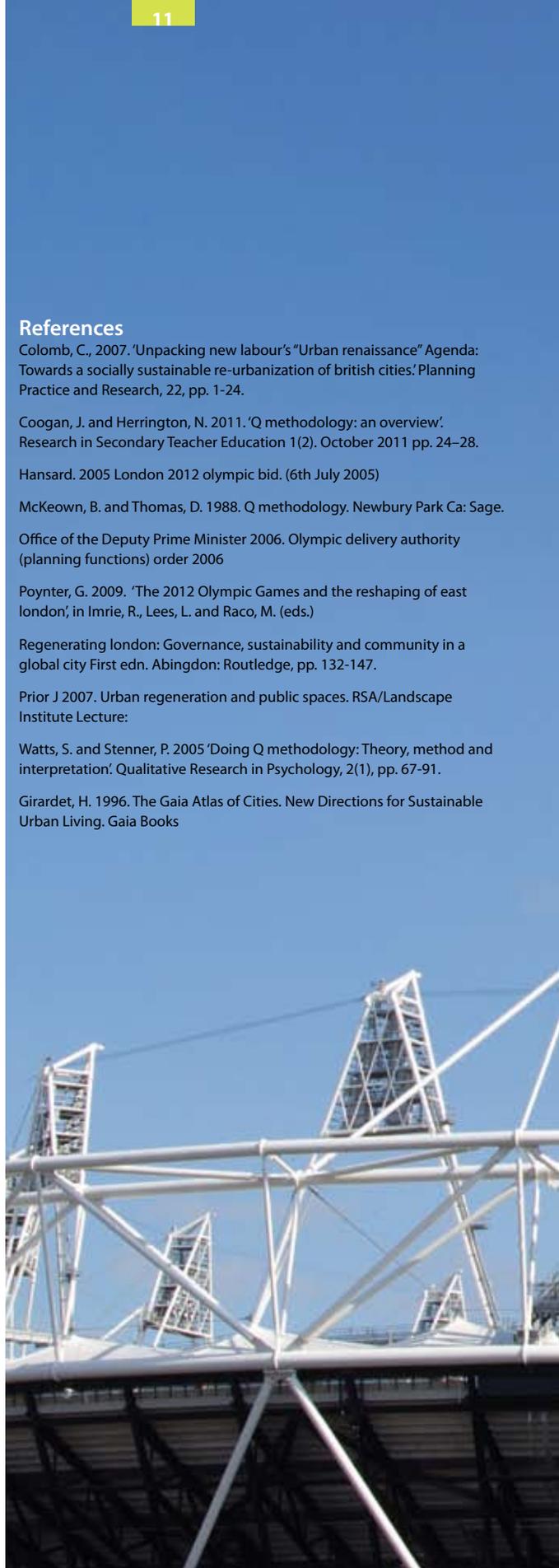
Whilst this is a very local project, the ways of working that are being explored through the development of this network have implications that extend to the global stage. The group works within the dynamic area between formal and informal education and place-making – the understanding and consequent development of the urban environment, and the communities within that environment. It is now a common strategy to link regeneration initiatives and place-making to major events, such as the Olympic Games. The network's engagement with the Games, rather than through the Games, will be useful to communities around the world where event-led regeneration becomes a feature of their development. The ability of citizens to become involved in what can be seen as something that is corporately driven is important. As Girardet notes:

"As cities fast become humanity's premier habitat, the challenge of the future is to give people a sense of existential security. Cities must become socially, economically and ecologically sustainable, fulfilling basic human needs for shelter, subsistence and social cohesion. For this to work the active participation of people in shaping their urban environment is crucial...we must take responsibility for creating an urban lifestyle that is compatible with sustaining an intact biosphere" (Girardet, 1996 p119).

The Games, or any other event, can be used as a catalyst for the development of social capital, and the expertise and influence of partners within the RCE network can further be used to build authentic alliances that are rooted in the interests and concerns of the communities, developing a dialectic between the local and the global.

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RCE KwaZulu-Natal: Shiyabazali Settlement: Water Quality Monitoring and Community Involvement

Jim Taylor

Londi Msomi

Liz Taylor

RCE KwaZulu-Natal

RCE KwaZulu-Natal is located in the province of KwaZulu-Natal in South Africa. The province is one of the largest geographically. It is home to approximately 8.7 million people or 21 percent of South Africa's total population. People live primarily in rural areas, with many making a living as migrant workers in Johannesburg or Durban. RCE KwaZulu-Natal is based at the WESSA (Wildlife and Environment Society of South Africa) uMngeni Valley Nature Reserve, close to the town of Howick in the KwaZulu-Natal Midlands. The RCE involves multiple partners who share a common vision of enhanced sustainability through more informed lifestyle choices.

The RCE's objectives include: the promotion of wider networking and collaboration related to education for sustainable development (ESD) processes; the development and implementation of ESD policy; education and training courses in ESD; the development of participatory, low-cost, accessible learning support materials for ESD; and research, including monitoring and evaluation of ESD projects and programmes (RCE KwaZulu-Natal, 2011). A recent partnership approach that addresses a serious water pollution issue in the region is being advanced by the RCE. By working together in a positive and supportive manner, rather than being critical of authorities and acting in a narrow activist approach, relationships are developing and there are now signs of true, meaningful change.



Working partners :Phumzile Mjoza (Shiyabazali Resident) & Londi Msomi (WESSA) collecting a sample at the outflow pipe.

Project Overview and Achievements

The uMngeni River is the main water source for Pietermaritzburg and Durban, the two largest cities in KwaZulu-Natal. Although it is not a large river, an estimated one thousand million litres of potable water is distributed from the uMngeni River each day. The river is under tremendous pressure and becomes increasingly negatively impacted as it flows towards Durban. Polluted storm water and toxins from industries, sewage, and excess nutrients from fertilizers contribute to turning this river, which is pristine at its source, into a polluted canal where it approaches the sea. The more polluted the water becomes, the more difficult and costly it is to treat the water to acceptable potable (drinkable) levels, and the more expensive it becomes for users. In a water-stressed country, the ability of this river system to supply ecosystem services in the form of clean water is severely compromised by the direct and indirect activities of people. RCE KwaZulu-Natal and its partners are seeking to address and overcome the water quality challenges. A partnership approach, with local community involvement, is showing some signs of success. The project mobilises members of the local community and community partners to regularly monitor water quality in the river. This measurement has, in turn, led to changes in practice by a waste water treatment works to improve the quality of its waste water effluent entering the river system.

Project Context and Background

The Howick Waste Water Treatment Works (WWTW), situated to the south of Howick, deals with all the sewage, or waste water, from the towns of Howick, Howick West and Mpophomeni. Between six to eight mega-litres a day are treated at the WWTW. Once treated, the water is released back into the uMngeni River through a large outflow pipe. The outflow pipe spills out through the informal settlement of Shiyabazali. The water then enters the uMngeni River 130 metres below. The uMngeni Water Audit Reports from May 2010 to Jan 2011 revealed that the Howick WWTW outflow had not been able to achieve full compliance with the prescribed Water Affairs discharge limits. This contributed to the increasing eutrophication trend reported at the downstream Albert Falls Dam (Groundtruth, 2009). The Albert Falls Dam is a primary water supply source for Durban, South Africa's second largest city.



RCE Working partners: Liz Taylor (DUCT) Scott Haworth (UKZN Researcher) Bongjiwe Mthenjwa (WWTW Manager)

Ensuring that the released water from the Howick WWTW is of a satisfactory standard is very difficult. This is due, in part, to a number of factors that influence the quality of the outflow water. These include:

1. **The amount of sewage water entering the WWTW:** Since the inflow cannot be controlled, when flows are high the ability of the treatment works to process all the polluted water is compromised. Once the inputs increase, for example through excess storm water, the Howick WWTW cannot cope and this can lead to brown effluent flowing into the uMngeni River.
2. **The aerobic process of the WWTW operations:** Should the delicate balance of oxygen and bacteria be compromised, the treatment may not be satisfactory. This can lead to treated effluent that does not meet required discharge standards.
3. **Mechanical breakdown:** Various technologies help manage the waste water. These range from mechanical sieves to aerators. Should such machines break down, the quality of the outflow water becomes poor.

All this is further complicated by residents who often throw waste and litter into the outflow.



The WWTW outflow. Residents often throw waste and litter into the outflow which then removes the waste from the village – and deposits it in the uMngeni River

For the past 10 years water samples at the WWTW outflow have been taken by the Department of Water Affairs, uMngeni Water and NGOs such as WESSA and DUCT (Duzi uMngeni Conservation Trust). These results reveal that, on a monthly basis, there are many samples with high sludge content. In addition, a septic condition is

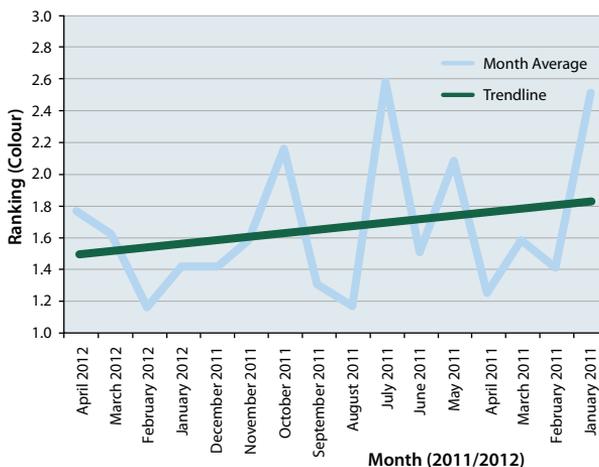
sometimes evident. Despite the adverse accounts from this testing, as well as reports of visual and olfactory issues, the quality of the effluent has remained consistently poor for a number of years. Pressure from public and scientific bodies appeared to be achieving little and the poor quality effluent continued to flow. In recent photographs a swathe of green can be seen down the hill adjacent to the outflow waterfall and a distinct sludge patch in the river downstream from the outflow pipe. This swathe represents the high nutrient load still present in the outflow water, which results in an accelerated growth of vegetation.

Building Relationships Through Public Participation

As early as 1975, Lawrence Stenhouse pointed out that community, or relationships, are more important than communication if meaningful social change is to occur (Stenhouse, 1975). Good relationships are therefore important if long-term social change is the objective. In general, most people would like to do a job that does not harm the health and well-being of their neighbours.

Fig 1. Water Quality Ranking System at Shiyabazali Outlet Pipe

Collections by: Londi Msomi & Phumzile Mjoza
Research Analysis: Scott Haworth & Liz Taylor



ANALYSIS KEY

- 1 – **Completely clear** (1.5 Clear with very small amount particulate matter)
- 2 – **Fairly good** Clear with particulate matter(2.5 Particulate matter)
- 3 – **Not good**
- 4 – **Very bad** Extremely dark, completely saturated with particulate matter

Graph showing the average ranking value for each month for 2011 and the start of 2012.

Working under these assumptions, in January 2011 members of DUCT, namely Dave Still and Liz Taylor, and Londi Msomi of WESSA, set up a different form of water quality monitoring that engaged a wider community of partners. They are working closely with residents of Shiyabazali, like Phumzile Mjoza. Ms. Mjoza is paid a small stipend for taking a visual (turbidity) sample, three times a day (8h00, 12h00 and 17h00). This is done using gloves, to avoid contamination, and small sampling bottles. These samples are then collected by Londi Msomi and photos are taken to record the findings. The samples are then categorised according to the levels of turbidity (discolouration). The average of the samples for each month has been plotted on a graph (see Figure 1). A linear trend line, applied to the data, shows a decrease in the frequency of unsatisfactory samples collected. At first most samples were dark brown in colour, by the end of February 2011, however, the water quality was somewhat improved. The various partners then sought to discover what had contributed to the improvement.

At a meeting between Ms. Taylor from DUCT and Bongiwwe Mthenjwa, the manager of the Howick WWTW, Ms. Mthenjwa noted that she had heard that members of the Shiyabazali community were involved in collecting and monitoring the quality of the water leaving the WWTW. Since she and her staff had heard about the water sampling at Shiyabazali, they had re-doubled their efforts to ensure that the effluent from the WWTW was of a satisfactory standard. Is this a form of public participation that, when situated in a local, neighbouring community, is able to complement the efforts of the authorities? Clearly the local relationships are important to the staff at the WWTW. While many of the staff members at the WWTW do not know the scientists or NGO members who usually take water tests, it is more likely that they do have relationships with people living on their doorstep, literally a few hundred metres away from the WWTW. One wonders whether it is possible that these relationships contributed to their motivation to do the right thing for their neighbours.

Concluding Reflections

Although the waste water effluent from the Howick WWTW has improved to some extent, and staff are making greater efforts to ensure that the outflow water is not contaminated, the facilities are inadequate to cope with the high amounts of sewage that, at times, enters the

WWTW. Each month a number of samples still reveal a shocking level of sludge in the 'treated' outflow water that enters the uMngeni River. A radical upgrade of the facility is clearly a pressing need.

With increased monitoring, reporting and documentation as well as communication and dialogue about the issues, a deeper level of understanding around these complex water quality issues is developing in the diverse Howick communities. This form of public participation appears to be building relationships, increasing understanding of the issues, and leading to some improvement in service delivery outcomes. Public activism on the other hand, where finger pointing and blame is emphasised, can lead to a situation where opinion is polarised and concerted efforts to solve problems may even be compromised.

Greater efforts are needed by all contributing partners in RCE KwaZulu-Natal if the serious water and sanitation issues in the area are to be solved. Clearly, innovative public participation processes – especially those that engage communities in finding out about issues and working collaboratively in response – are needed. RCE KwaZulu-Natal's grateful thanks is due to all partners, many of whom appear in the photographs, who participated so openly and readily in these field-work and action-related responses.

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Despite a slight improvement in the water quality occasional samples are really bad. Londi and Boyi (who also assisted in the water quality monitoring) display a sample thick with sewage sludge.

RCE Cairo: The EduCamp Project – A Multi-Level Cooperation of RCEs

Hani Sewilam

Challenges & Opportunities

Egypt suffers from overpopulation, with a population that is expected to rise to more than 100 million by 2020. Egypt's economies are based on resource-intensive consumption and production patterns as well as unsustainable development. As a result, Egypt is now facing a number of key environmental challenges, including air and water quality, waste management, coastal pollution, and desertification. Air quality is deteriorating in Egypt, particularly in Cairo and Alexandria, where more than 80 percent of the country's industrial activity takes place. Water quantity and quality are both negatively impacted. There is acute water scarcity whereby per capita water share is expected to decline from a current level of 900m³ to about 670m³ by 2017. An average of 15.3 million tonnes of municipal solid waste is generated each year, out of which almost 2.5 million tonnes remain uncollected and lack appropriate sanitary landfills for their final disposal. In 2004, Egypt's total carbon dioxide (CO₂) emissions were estimated at 158 million metric tonnes, which represents some 1 percent of total world emissions (ILO, 2010).

Meeting the Millennium Development Goals in Egypt requires production and consumption of more goods and services to meet basic needs. But building a more sustainable society requires more sustainable consumption and production (SCP) systems – not only in terms of market growth and resilience, but also in terms of productive non-market relations, ecosystem health, quality of life and the well-being of all involved (UNU-IAS, 2012). SCP aims at “doing more and better with less”, by reducing resource use, degradation and pollution along the whole life cycle of goods and services, while at the same time increasing quality of life for all (UNDESA, 2010).

Achieving SCP in Egypt requires a significant paradigm shift throughout the whole society, and across-the-board cooperation and engagement by businesses, consumers, workers, policymakers, researchers, scientists, retailers, media, and development cooperation agencies. SCP can offer Egypt and other countries opportunities such as the creation of new markets, green and decent jobs

(e.g. markets for organic food, fair trade, sustainable housing, renewable energy, sustainable transport and tourism) as well as more efficient, equitable, and welfare-generating natural resource management (UNDESA, 2010). RCE Cairo and its stakeholders, including universities, NGOs, schools and government bodies, are helping meet these Egyptian challenges mainly through SCP and education for sustainable development (ESD). Although Egyptian experts in SCP and ESD are available and aware of local circumstances, the partnership and engagement of international experts would allow a diverse array of actors to take joint action towards the shared goals of sustainable development (SD) and meet the challenges of Egypt. The global network of Regional Centres of Expertise on Education for Sustainable Development (RCEs) offers individual RCEs access to specific knowledge and know-how through the network. This chapter describes a Euro-Egyptian partnership among four RCEs from the global network that are working together to contribute to sustainable development in Egypt through the nationwide promotion of ESD.

ESD for SCP

ESD acts as a gateway that can be used to shift society towards sustainability. ESD helps people develop the values, perspectives, knowledge, and skills needed to make smart, sustainable choices. ESD provides for long term, systems thinking that can effectively deal with the complexities of SCP while building partnerships across traditional boundaries. It is this ability to promote learning through innovative, multi-stakeholder partnerships and across a variety of sectors that makes ESD key to developing the competencies and capabilities integral to SCP (UNU-IAS, 2012).

The RCE cooperation presented in this chapter encourages SCP in Egypt through the nationwide promotion of ESD. It is necessary to develop clear and direct linkages between consumption and production issues and educational processes. It is also recommended to ensure the following aspects while developing education for sustainable development (ANPED¹, 2012):

¹ The Northern Alliance for Sustainability (ANPED) is a vast network of NGOs in the Northern hemisphere with a mission to pro-actively promote the agenda on environmental justice and systematic change for the Economy.



ESD helps people develop the values, perspectives, knowledge, and skills needed to make smart, sustainable choices



The participants of the TOT modules try activities in order to train teachers on implementation



Students of grade 5 and 6 trying EduCamp activities

- Integrating knowledge of relevant consumption behaviour into curricula from pre-school to universities and in the concepts of lifelong learning;
- Providing data for reliable information on consumption and production patterns;
- Reporting on indicators to shape consumption behaviour that can make a difference.

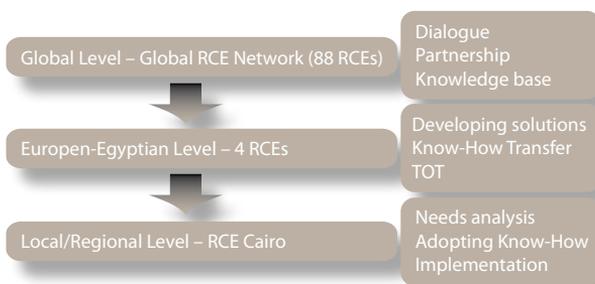
These aspects, among others, have been considered in the cooperative project to promote ESD in Egypt at a national level.

The Cooperation Model of RCEs in EduCamp

EduCamp is a project funded from the European Commission under the TEMPUS programme entitled "Education for Sustainable Development beyond the Campus". The wider objective of the project is to promote and implement ESD nationwide and beyond, including all education levels. This project involves 20 partners representing different stakeholders. This includes four RCEs, the RWTH Aachen University in Germany, the Egyptian Ministries of Education and Higher Education, seven Egyptian universities, Bibliotheca Alexandrina, three NGOs and two international organisations.

EduCamp is an example of the role RCEs can play in promoting ESD locally, while making the best use of the global RCE network. This model operates at several geographic levels: at the local level in Egypt where the sustainable development challenges have to be met; at the Euro-Egyptian level represented by the partnership between RCE Cairo and three European RCEs (RCE Graz-Styria in Austria, RCE Creias-Oeste in Portugal, and RCE Ireland); and at the global level that makes use of the Global RCE Network.

Fig 1. The Multi-Level Model of RCE Cooperation



Sharkeya's SEKEM School serves as a pilot school of the EduCamp project

RCE Cairo & Local Activities

RCE Cairo as the sub-national consortium in this partnership was responsible for analysing local sustainability needs and communicating them with the European RCEs and other consortium members to find appropriate solutions. The Egyptian partners then adopt and modify the available know-how to meet the local ESD challenges. For example, European and global best practices such as school activities and materials have been collected by the European partners and made available to the Egyptian partners. RCE Cairo, together with Alexandria University and Suez Canal University, has modified the content to match local problems and culture before implementing them locally.

To ensure the successful promotion of ESD in an Egyptian setting on issues such as water, energy, biodiversity and agriculture, RCE Cairo had to carry out a needs analysis to answer:

- To what extent do the national school curricula in Egypt tackle ESD and SCP topics?
- What are the needed improvements in order for the curricula to become an instrument for ESD?
- What skills needed to deliver ESD-related content are teachers currently lacking? And,
- What type of teaching methodologies and equipment are necessary to facilitate the ESD process?

RCE Cairo has carried out this analysis in collaboration with its local partners in six government schools in six different Egyptian governorates nationwide. It focused on the curricula of Grade 5 to Grade 9. The three main issues investigated were curricula, teaching methods,

and facilities and environment. The analysis helped identify the strengths and weaknesses of the school curricula with respect to sustainable development topics. It also crystallised what would be necessary to enhance teaching methodologies, teaching skills, and the surrounding environment.

Euro-Egyptian RCEs and Sharing ESD Knowledge

To overcome the identified problems in Egypt, the European RCEs, RCE Cairo and local universities worked to find innovative solutions, develop necessary materials and transfer knowledge through training programmes. The following objectives were defined to meet the challenges identified in the Egyptian schools:

- Developing Teaching ESD Resource Kits for Schools to provide activities for students and teachers that link the existing curricula to the surrounding community and focus on ESD and SCP.
- Developing Innovative ESD Teaching Methodologies to follow the concept “I hear and I forget. I see and I believe. I do and I understand.”
- Developing a School Teachers’ Training Programme (STTP) to enable teachers to use the developed materials and techniques.
- Establishing Seven Centres of Excellence inside the participating universities to Promote ESD and SCP in Egypt and provide training services and consultation for the Egyptian schools.

RCE Creias-Oeste coordinated the European RCEs and other project partners to develop five learning and teaching ESD Kits to enable the schools to incorporate SCP into their curricula. The kits were developed for students aged 10 to 14 years and were based on the needs analysis carried out by RCE Cairo. In all five kits, there are more than 200 various interdisciplinary activities linking the existing curricula to the surrounding community. Each activity includes a full description of the implementation (i.e. a teaching methodology). The activities are various, ranging from innovative group work, field trips, discussions, experiments, games, and research work to assignments that belong to sustainable development, water, energy and biodiversity.

In order to enable Egyptian teachers to teach the developed kits and implement them in their schools, the partner RCEs had to share and participate not only

in the development of the kits but also in training the teachers on teaching them. RCE Graz-Styria coordinated the process of developing and implementing a Training of Trainers (TOT) programme on ESD that prepares Egyptian trainers to transfer the European ESD/SCP knowledge to a wide number of local teachers in Egypt. The idea is to train Egyptian trainers in Austria, Germany, Portugal and Ireland during the project lifetime. All the involved RCEs and involved universities have contributed in designing and developing the training programme and its contents based on the available experience. The training programme includes topics covering ESD, water, agriculture, energy and biodiversity. Specific knowledge as well as innovative teaching methodologies will also be imparted. Three training courses have been organised for almost 50 trainers on general ESD knowledge, agriculture and bio-diversity. The trainees are preparing to transfer this knowledge by organising trainings in Egypt for school teachers.

The Training of Trainers Modules that have been organised already support Egyptian teachers – especially in public schools – who teach students from age 10 to 14 years. The contents of the training modules are aligned to the Egyptian school curriculum and hence can easily be applied during school lessons. Furthermore, during the training, innovative teaching and learning methodologies have been presented and applied so that teachers get to know a variety of methods which foster interactive and participatory teaching. In total, nine training modules should take place in this project, which are divided under three aspects: two training modules on ESD; five thematic training modules on sustainable development, agriculture, biodiversity, energy and water; and two pilot projects implementing this training. This work is expected to train 150 Egyptian trainees by the end of 2013.

Box 1. Developed School Kits on SCP and ESD

Five Teaching and Learning Kits on Education for Sustainable were developed to enable schools to incorporate SCP into school curricula. There are more than 200 various interdisciplinary activities linking the existing curricula to the surrounding community. The activities are various ranging from innovative group work, field trips, discussions, experiments, games, and research work to assignments that belong to at least one of the following clusters:

Sustainable Development:

This cluster of school activities introduces students to the concept of unsustainable and sustainable behaviours and encourages them to explore the main ideas of SCP and how to become more sustainable within their own lives, homes, communities and countries. The clusters add to student knowledge relating to sustainable development and key scientific principles and cycles that are instrumental in a sustainable world, but also encourage them to challenge their own consumption behaviours and that of their community.

Agriculture:

The agriculture cluster deals with agriculture in Egypt, farming and agricultural production, and food consumption such as healthy food, and local/seasonal products. Organic waste and composting are addressed as well as impacts of climate change on agriculture, exports, imports and food supply in Egypt.

Biodiversity:

This cluster deals with biodiversity, ecosystems and their types, food chains, the interconnectedness of plants and animals as well as the concept and importance of protected areas are introduced. Additionally the links between biodiversity and culture, health and society are mentioned. Population growth, pollution and its linkages to environmental sustainability are addressed as well as the DNA of biodiversity and the genome project.

Energy:

This cluster focuses on renewable and non-renewable sources of energy, its worldwide distribution and impact. The increased worldwide demand on energy is mentioned and how it could be managed, forecasts of oil availability as well as scenarios of a life without oil are furthermore introduced.

Water:

This cluster addresses the water cycle and regional influences, drought and flood, evaporation, sea level rise and the melting of glaciers. Water scarcity, pollution of water and water rights are explored, the distribution of water around the world as well as the individual consumption of water is highlighted. Additionally the clusters deal with the case of the Nile and the general situation of water availability in Africa.

The Role of the Global RCE Network

There are currently more than 100 RCEs operating around the world promoting ESD in their countries. At the global level, RCEs create dialogue, partnerships and a knowledge base around sustainable development based on local priorities and issues. The consortium of the EduCamp Project made use of the best practices available at the global level and followed the model of RCEs to establish seven new centres of excellence on ESD that would apply to the United Nations University to be acknowledged as new RCEs in Egypt. The new centres have been established at seven different Egyptian universities across Egypt. The main aim of these centres is to sustain the activities of EduCamp and continue offering consultation and training services to Egyptian teachers and ensure further promotion of ESD. The main principles of the Global RCE Network were considered while establishing these centres:

Geographical scope: Each of the established centres is located in a different governorate and is focused on a specific region (Giza, New Cairo, Alexandria, Fayoum, Zagazig, and Ismailia).

Regional challenges: Each of the centres focuses on the threats that the region faces and challenges to sustainable development: the Giza Centre focuses on air pollution; the one in New Cairo focuses on energy efficiency and renewable energy; in Alexandria the focus of the centre is on biodiversity; in Ismailia water will be the core of the activities; and agriculture will be the core of the centre in Fayoum.

Regional Partnership: Each of the centres will be affiliated with surrounding schools and other stakeholders who will support the realisation of its mission and vision.

The centres are in the process of being accredited by the Egyptian Ministry of Education to be official training bodies of Egyptian teachers nationwide. The centres will act as nodal points for networking among various education stakeholders, such as universities, schools, NGOs, and companies, as well as local and regional governments and ministries. Each centre is planning to have the capacity to serve about 30 schools in its respective region. Furthermore the Centres of Excellence should become role models for other universities. All the centres are acknowledged bodies inside the local universities and have their own bylaws.

The Way Forward

The three-level model of the RCEs' cooperation has proven its effectiveness in tackling ESD challenges in Egypt. The model has received acceptance from local partners, including the Ministries of Education and Higher Education. The cooperation of RCEs has enabled: contributions to the local educational challenges in Egypt through sharing and exchanging knowledge and experiences; the development of a detailed analysis of the deficit in the Egyptian school curricula through the activities of the local RCE; the identification of the lack of skills in relation to sustainable development of Egyptian teachers; the development of educational solutions based on the experience of the participating European RCEs; the development and delivery of TOT for teachers; and the use of the experience and best practices available at the global level of RCEs to establish seven new RCEs in Egypt.

The Egyptian Ministry of Higher Education has formed a technical committee to review the developed school activities and proposed modifications to the school curricula nationwide. Once the committee approves the proposed modifications and new activities, they will be first implemented in the Egyptian experimental schools distributed all over the country.

In the next phase of EduCamp, the European RCEs, in collaboration with the Egyptian experts, will continue the implementation of the TOT programme by organising trainings in Austria, Germany, Ireland and Portugal. It is expected to train 150 academic members from the seven Egyptian universities involved in the project. The trainers will be offering the same training programme for Egyptian teachers by the second half of 2013. Each of the newly established centres will cover its region with at least 30 schools. The established centres will join the global RCE network once acknowledged by the United Nations University.

Although EduCamp is running during a very critical phase of the Egyptian revolution and a very difficult political situation, the project is known in Egypt as one of the most significant initiatives for improving the Egyptian education system and linking school curricula to the country's needs for sustainable development and sustainable consumption and production. EduCamp is a real demonstration of the

significant impact of the Global RCE Network in achieving local objectives in line with the Millennium Development Goals and the UN Decade on Education for Sustainable Development.

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RCE Rhine-Meuse: The OPEDUCA Project

Understanding the Transformational role of ESD



J.F.G. Eussen

Understanding the relevance, working and effects of human learning in a regional societal context seems essential to transform education and take it forward, moving from traditional, disempowering teaching towards entrusting young people with the ability and opportunity to learn for and change the future.

Developing relationships between schools, private industry, knowledge institutes and regional governments while encouraging a “flat” coordinating structure based on authentic action and learners’ ownership are two concepts at the heart of the OPEDUCA project. Defining and operating Open Educational Regional Areas (OPEDUCA) is a key goal of the project and, at the same time, an essential means for the project to realise education for sustainable development (ESD).

RCE Rhine-Meuse

RCE Rhine-Meuse in the Netherlands has developed and implemented a vision of learning based entirely on ESD. Going far beyond short term projects or limited campaigns for ESD, the RCE uses ESD as the best strategy to realise learning, knowledge development and entrepreneurship on the most relevant themes and challenges of today and tomorrow. In RCE Rhine-Meuse’s vision of ESD, the ‘People, Planet, Profit’ mantra has been replaced by ‘Dimensions of Sustainability’ in which ecology comes first as the basis for well-being and welfare. Well-being, the second dimension, indicates the absolute necessity to achieve, at first, an acceptable level of living for all, especially globally in a globalising world. Only then can one accept – and will human nature ask for – the third dimension: accepting differences in welfare derived from excellence in skills, knowledge and competences¹. Operating in the most southern cross-border region of the Netherlands, located only 20 miles from the borders of both Belgium and Germany, RCE Rhine-Meuse faces the challenges of a region of 4 million citizens suffering high unemployment rates, youth emigration and substantial pressure on scarce natural resources.

The strategy of the RCE, embedded in the OPEDUCA Project, was developed in cooperation with schools, companies, local government and science institutions, and it defines and enhances empowering alliances for learning. Aiming at lifelong learning processes and with a focus on the themes most relevant to the future, such as water, food, energy, sustainable building, and social cohesion, the strategy is translated into tactical instruments, with hands-on qualities and an effect that is visible in daily operational practice and action. The reorientation and transformation of curricula goes hand in hand with development of entrepreneurial skills and competences to turn sustainable thinking into action. ESD thus becomes the best means for societal transformation towards sustainability, directly raising societal awareness and behavioral changes in the fields of sustainable consumption, production and management of scarce resources, such as energy, food, water, minerals and air.

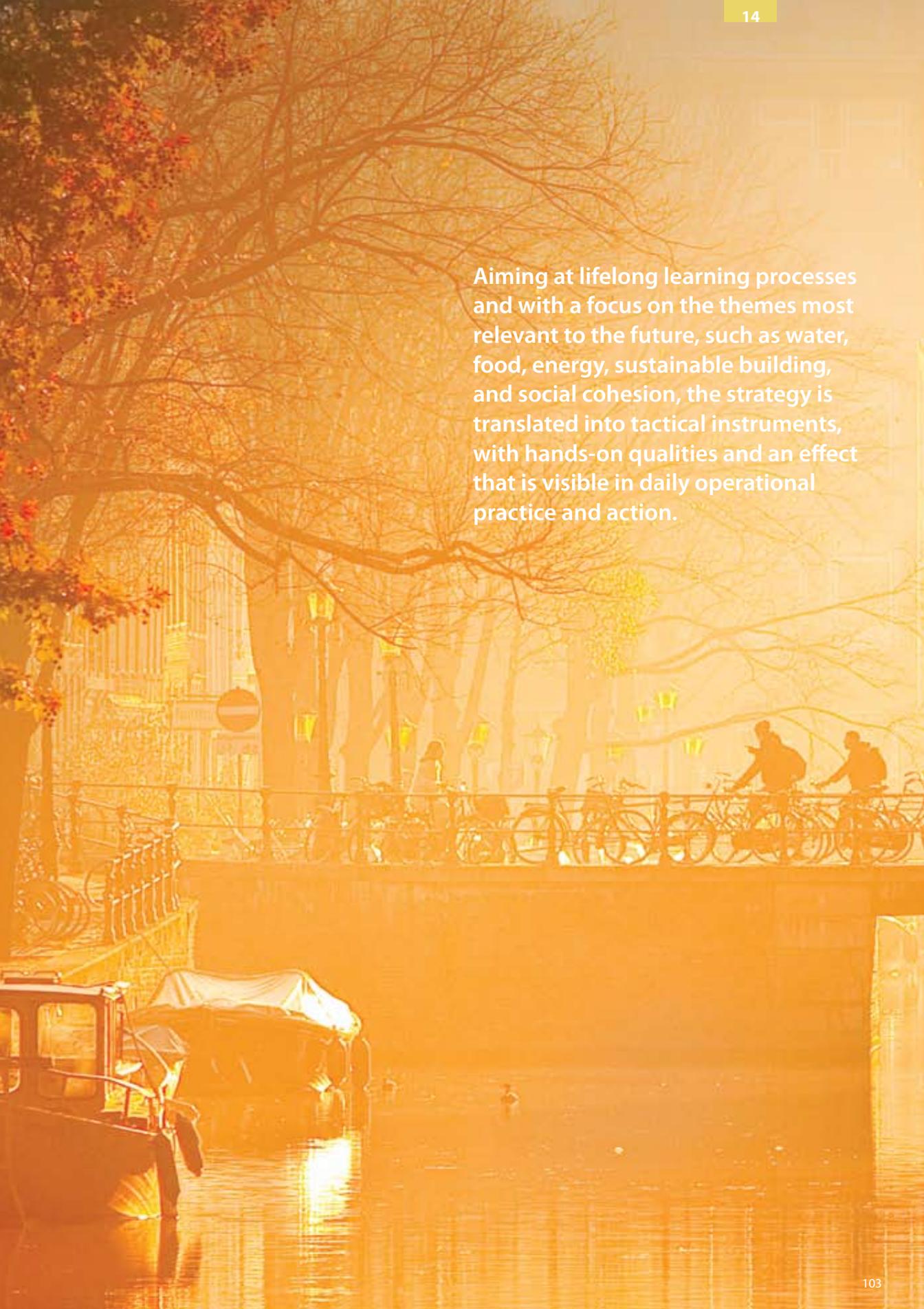
Project Background and Results

The OPEDUCA Project brings together all forms of education – ranging from early childhood to further education – in such a way that both efficiency and effectiveness of individual learning processes are increased. The ongoing thematic learning lines, incorporating all subjects, shorten the time needed for instruction and offer more in-depth study opportunities for a variety of student talents. The project results in leaner, better and more efficient education.

Priorities in education (technology, language, math, citizenship, entrepreneurship) are merged through the effective instruments of the OPEDUCA Project, making ESD-based learning and schooling very attractive for schools to implement in times when resources (teachers, funds, materials) grow scarce.

Based on the logic of the ‘Dimensions of Sustainability’, the OPEDUCA Concept takes away the unworkable pressure of achieving the ‘People, Planet, Profit’ balance. The way the ongoing learning lines are constructed and operated

¹ Welfare then per definition only to be based on sustainable development in the dimensions ecology and wellbeing first - whereas ‘welfare’ in present day society is still based on inequality (‘the rich getting richer’ no matter how sustainable or not they are and act). Differences in welfare based on differences in positive societal impact however are part of human nature and a prerequisite for progress in a market driven economic system. The essence of this dimension in ESD is to accept welfare but only based on, derived and coming from, actions honoring ecology and wellbeing.



Aiming at lifelong learning processes and with a focus on the themes most relevant to the future, such as water, food, energy, sustainable building, and social cohesion, the strategy is translated into tactical instruments, with hands-on qualities and an effect that is visible in daily operational practice and action.

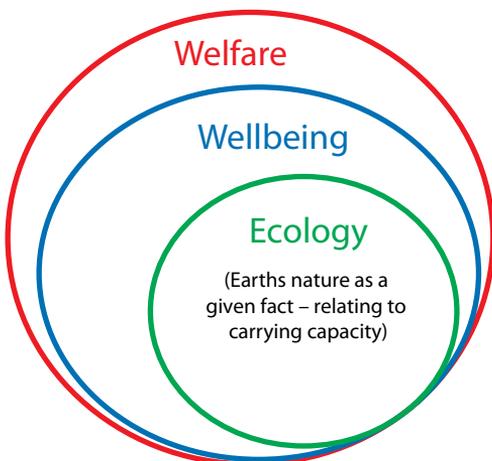
follows a more natural understanding of, first, learning about and cherishing ecology then striving for an equal spread of well-being and, furthermore, accepting welfare.

Inquiring, placing and using knowledge from industry and science appears to adequately increase behavioural change through learning to progress towards a sustainable society. The continuous entrepreneurial approach and presentation of all learning actions in OPEDUCA contributes to an entrepreneurial spirit that can generate ideas and turn them into action. This action- and result-driven quality of the project is not only important for the structural implementation of ESD but also interesting from an economic and employability point of view.

The Open Educational Regions (OPEDUCA)

The holistic and practical approach of the OPEDUCA concept and project means that learning content and action towards regional sustainability are cooperatively developed and shared on a regional scale, allowing people to work in close contact with each other. Within and between such collaborative space, OPEDUCA schools (from primary to higher education) cooperate with diverse organisations, including science institutions, the business sector, municipalities, centres for environmental education, and libraries. A human-based approach and practice can be found in any culture and socioeconomic regional society; a mere global connection of such regions can bring ESD to the forefront of realising sustainability worldwide.

Dimensions of Sustainability



RCE Rhine-Meuse acts as the catalyst to define and push the process forward until it gathers momentum. The RCE Secretariat, brought together and funded by the partners, spends a limited time acting as an office/secretariat and as much time as possible in performing and guiding project operations. The focus is on change and impact, not on the organisational aspects of the RCE (less than 15% of time is spent on meetings, steering groups, conferencing, travel, etc.). It is also for this reason that the cooperative term 'The OPEDUCA Project' is used as the common base for partners' communication and output-driven actions. RCE Rhine-Meuse went beyond the mere construction of a network through which organisations can find and meet each other. Through the OPEDUCA Project, a new reality is envisioned, defined, underlined and supported by partners, bridging vision and actual operations in learning and education. The OPEDUCA Project is what partners do together – their day to day practices and routines are not what is prominent, rather the added value of the new educational reality developed and operated together.

From an organisational point of view the RCE is fully independent, with no more than a handful of people to manage the RCE and an enormous range of partner organisations that act cooperatively. The entire output and value of the RCE is unique. It in no way incorporates results, projects or achievements of other organisations or stand-alone partners; it only shows new and real added value as a valid base for its cooperative actions and funding. Partners acknowledge their achievements in ESD to each other and to the group of stakeholders – through meetings and news bulletins for example – but also focus on what is truly necessary, which is a range of innovations. An example of this can be found in the continuous projects aimed at outside-in curriculum change.

This way of positioning and operating the RCE is most crucial as it is a highly effective way to realise ESD, especially when compared to RCEs or other similar network organisations that operate too often through the current activities of partners and spend significant time on coordination, governance, procedures and meetings. In those cases, the network organisations do not act as a change agent bringing added value innovations but instead find themselves stuck in the midst of a bureaucratic process, protecting interests and spending much time and energy in meetings and conferences.

While working with and on behalf of youth is a strategic choice of the RCE in realising ESD, OPEDUCA is not a youth project in the traditional sense. The concept involves all of society to achieve a transformation towards sustainability through formal and informal holistic learning.

Instead of relying on fixed curricula and textbooks, OPEDUCA is based on the unfolding learning process around themes relevant for our future. Learning processes and content are continuously and collaboratively constructed by teachers, pupils, students, scientists and staff from leading organisations. Learning in OPEDUCA takes place anytime, anywhere, with anybody and through any device, so called 'AAAA-Learning'². It is open source, in reality and on the web.

By involving a multitude of parties, the development of OPEDUCA helps regions evolve into learning societies. In short, OPEDUCA is about:

1. The construction of on-going learning lines on sustainability issues such as food, water, building, transport and energy.
2. Forming regional networks of schools, knowledge institutes, companies and local governments to support collaborative learning for sustainable development.
3. Training of teachers and empowering schools as focal points in their own open educational region, as well as guiding and informing experts, managers and politicians in taking part in OPEDUCA.

The OPEDUCA Project uses a range of strategies to operationalise the concept and make the alliance work. These instruments include:

1. **Flight for Knowledge** – Ongoing interactive learning lines, from primary to higher education, on future relevant themes integrating formal and non-formal education, all school subjects and external sources of knowledge and experience.
2. **Business Class** – The promotion and enhancement of people's ability to turn ideas into action (entrepreneurship), training youth, teachers and public managers to become the entrepreneurs of a more sustainable future.

3. **Teacher Training** – Master classes and training to renew teachers' positioning in schools, develop their skills and competences to realise the OPEDUCA Project and enhance their professional skills and attitude.
4. **Educational Partnership** – Reconstructing private/human connections in local society to learn cooperatively, take action in the micro economy, and to re-establish the role of educators and parents.
5. **Internationalisation** – Balancing regional development and globalisation, operating all instruments and projects in OPEDUCA cross-border and globally, realising world citizenship, relevant insights and the sense of responsibility. Therewith bringing the existence and need for preservation of cultural heritage to the foreground.

These instruments present both a set of guiding principles and operational plans to develop OPEDUCA Regions and perform operations. Although each instrument can be considered separately, in practice they form one integrated continuous approach through which basic priorities in education (such as technology learning, reading, presenting, ICT), companies' corporate social responsibility and key societal aspects such as sustainable consumption and production are merged in one consistent and on-going action programme.

Flight for Knowledge

One of the methodologies that RCE Rhine-Meuse has developed, tested and put in working practice is called 'Flight for Knowledge'. The name refers to the almost infinite access of the young and, through their learning, of society at large to sources of knowledge, practice and experience needed to become empowered and to facilitate broader societal development.

A Flight for Knowledge envisions the cooperative development of maximum knowledge on themes, like water, food or energy. It can be pictured as a logical, structured mind-map, growing, expanding, and deepening practical levels of knowledge, thinking and action.

An example of one of the many Flight for Knowledge good practices is based on the theme of water and comes from the Graaf Huyn College in the city of Sittard-Geleen.

² J.F.G. Eussen – 'A Flight for Knowledge', to be published spring 2013

The Sittard-Geleen region is still dominated by the effects of its former mining industry and it copes with a range of sustainability challenges in the fields of environment, employment, social cohesion, and building.

A group of 200 third grade students, aged from 14 to 15, started working on the theme in late 2011. RCE Rhine-Meuse connected them to more than 30 companies, several universities, knowledge institutes and government institutions to gather more knowledge about their self-defined research topics.

RCE Rhine-Meuse, in cooperation with the school, developed a timeline that fit exactly into the school schedule and programme, laying the basis for a smooth and structured process. The school teachers attended RCE-based Master classes in order to be able to implement the Flight for Knowledge in the most appropriate way. In a three day learning-by-doing process, they became acquainted with the philosophy, methodology and the process behind Flight for Knowledge, while meeting experts and practitioners from industry and government.

The teams of students explored the theme of water, performing extensive research and sharing and debating the answers they collectively found. Questions that remained unanswered were handed over to the RCE secretariat, partner companies and knowledge institutions. A phase of arranged visits from students to their “partners in knowledge” followed. These were full of guided tours, excursions, debates and experiments. Lessons learned during the visits were presented by students at the School Market, where the students presented their findings to peers, managers, parents, teachers and policymakers. This phase alone was a large happening and became a festival of learning for 200 students and around 300 visitors.

For schools, the Flight for Knowledge methodology appears to offer a well-structured and structurally implementable pedagogical approach that fully integrates science education, entrepreneurial learning, citizenship, and internationalisation. The essence of the approach is problem-based, inquiry-based, and cooperative learning by youth, empowering them to see the world through different perspectives.

Each Flight for Knowledge process grows into an ongoing learning line from primary to secondary and into higher

education. Such a result makes it possible for pupils and students to continuously learn in a realistic, cooperative, problem-based and science-based way, on the basis of real-life issues that can be shared, communicated and learned with many people within their reach.

In the Netherlands, where 40 pilot schools are working with Flight for Knowledge in daily practice, they gradually open their own geographical and virtual OPEDUCA through which in- and out of school learning merges into one dynamic, challenging and realistic learning space. Teachers repeatedly confirm that it is possible and desirable to construct each Flight for Knowledge in such a way that it fully integrates the curriculum. Indeed, students are now asking for much more than what current curricula offers, and both students and teachers understand that there is much more to learn and understand.

The school teachers attended RCE-based Master classes in order to be able to implement the Flight for Knowledge in the most appropriate way. In a three day learning-by-doing process, they became acquainted with the philosophy, methodology and the process behind Flight for Knowledge

The development of entrepreneurial attitudes and skills is essential to the learning as described here. Students are not only challenged, but also trained and educated to see themselves as owners and entrepreneurs of a more sustainable future in all Dimension of Sustainability. They learn and experience, for example, how society is structured and operates, and how powers rule. They go out in society, observe, interview, inquire, report, analyse, draw their entrepreneurial plans, map and calculate them. Competences such as achieving an open and critical view, expression, communication, and interest in today's challenges – actually all competences defined in the UNECE process of capturing ESD competences – are not only learned but also experienced, tested, and improved. The student actions also grow into full skill development on the economic and marketing aspect of

entrepreneurship, for they construct and present their future-based business cases requiring skills that go far beyond the curriculum connected to their grade (e.g. market analyses, investments, personnel, costs, pricing, sales, lending, shareholder values, etc.).

Involving individual youth and groups of students, teachers and industry experts helps realise a true peer-to-peer learning community across continents. The RCE opens up Flight for Knowledge across borders, meaning that the students' inquiry-based learning is expanded to regions and peers worldwide, positioning and empowering youth as world citizens, basing their actions and values in the local community yet having the world within their reach. Students are no longer being pushed to learn, but invited to develop.

Through the OPEDUCA concept, school education is now better adapted to developing the knowledge and skills that students will need in the future, while also better serving societal needs in the regions. Students are enriched through learning focused on real-life situations, while also identifying employment possibilities and areas for post-secondary study. Teachers are no longer seen as 'reproducers of inert knowledge', but as facilitators and guides for learning.



Although the route is long with many challenges still to be addressed the intermediary results of the OPEDUCA concept and project are most promising in delivering learning from a holistic, integrated perspective, combined with hands-on practice and measurable effects.

Effective ESD: Learning Processes as Change Agents

The OPEDUCA concept, effectuated in the OPEDUCA project, brings about an implicit process of regional transition towards a green economy. Although there is a clear methodology behind it, the approach chosen allows and invites people to shape the process themselves, generating more ownership and thus lasting effects. It's untraditional approach and strict focus on learning as the best way to support societal transition seems to attract and involve organisations that willingly contribute and become crucial partners in realising ESD and its visible and lasting effect in a greener economy. The OPEDUCA processes unfold as processes of co-discovery and co-creation without restrictive goal setting, limiting organisational rules, processing without steering, and organising through a chain of cooperative relations.

The OPEDUCA concept and project are of value to the strategic priority of greening the economy. First, there is the renewed socialisation of learning through the approach, challenging youth and, therewith, adults. Compared to a more top-down approach governed by governmental or commercially-driven ESD campaigns, the more practical human-based (instead of organisation-centred) OPEDUCA approach unleashes local and indigenous knowledge, works with almost no threshold and no forced conviction and makes a greener economy a tangible belief. By bridging family life with life on the streets, working through schools, in regional businesses, with policymakers and regional government actors and by using qualitative insights of people in the region, participants become change agents themselves.

Second, modest local actions that result in both tangible and intangible positive effects of a greener economy, however modest, work better than passively watching a prophetic movie, the eight o'clock news or high-priced lecturing consultants. After all, most people would want fresh air when opening the front door, fish in their lake and less litter on the streets. Lifting the pressure on people to save the world – as sustainable development (SD)

promotions often imply – takes away a burden of guilt and frees the mind for direct action within one's own domicile and local sphere of influence. Human development was part of ecology and a green economy for millennia and only during recent decades did people begin to focus their efforts on attaining fictional wealth through consumption and greed. Calling on society's collective history of real needs will help people step back in order to move forward and create a more equal divide of well-being and a more sophisticated sense of welfare. The OPEDUCA project tries to reconnect people through local inquiry-based learning and experiences that lead to tangible and attainable results. Connecting this learning across borders will create global change towards a more sustainable future.

Thirdly, in the Open Educational Regions, the process of a cooperative society based on real-life learning brings behavioural aspects and responsibility to the forefront again. As the world learned in 2008 from the crises in the banks, an ever more complex globally interacted society cannot work in combination with impersonal and vague leadership influencing the course of our economy. Once globalisation is reconnected with regional culture, history, connected living and a renewed sense of responsibility and accountability, the basis for a green economy is there. Countervailing a common belief in SD debates that technical solutions take precedent over behavioural aspects, people are best served when they can consider and change their own behaviour and entrepreneurial attitude to make small changes where and when they can. This reestablishment and empowerment of the individual's role and ability to turn ideas into action is crucial to a behavioural change that will transform the present day 'welfare machinery for the few' to a green economy for all. This is a common sense yet still ambitious goal of the OPEDUCA project: serving society through gaining better insight into the essence of SD, no longer accepting the trade-offs in balancing 'People, Planet and Profit' but gaining an in-depth understanding of the Dimensions of Sustainability where the health of ecosystems is the first condition required to create and maintain well-being for all, and that, in turn, sets the options for acceptable differences in welfare.





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Achieving Sustainable Production Systems through New Multi-Sectoral Scholarly Partnerships: Parallels between the UN University's RCE Initiative and the Earlier Rise of Humanism and Science¹

Roger A. Petry, Ph.D.

Introduction

If history is to be any guide in seeking to move to new, sustainable production systems that include a green and socially just economy, we can usefully examine earlier historic transitions in production. A historical focus on earlier transitions in production is important where sustainable consumption and production is viewed as necessitating substantial changes to our current production practices and existing organisational and institutional arrangements. An examination of history is also merited in light of the significant amount of time between major transitions in production systems. A bird's eye view of history can shed light on the potential significance of the global network of Regional Centres of Expertise (RCEs) on Education for Sustainable Development that have emerged rapidly since the start of the UN *Decade of Education for Sustainable Development* in 2005. Now numbering more than 100 RCEs, they are notable for their emerging under a period of significant resource constraints and retrenchment within higher education globally and only modest financial support. Created under the auspices of the United Nations University as a global learning system, RCEs share important parallels with earlier multi-stakeholder scholarly initiatives that, in turn, were central to historic changes in production systems. These parallels support the contention that the RCE initiative is an important global institutional development in higher education and possibly an essential development in allowing new forms of knowledge production needed for transitioning to sustainable production systems.

An Institutional and Organisational Approach to Innovation in Knowledge Production

Substantive innovation for sustainable development requires innovation in both the institutions and organisational structures advancing research and other elements of scholarship (such as teaching and community

service). One can use definitions from new institutionalism theory to usefully distinguish between *institutions* and *organisations*. In this case *institutions* as defined by Oran Young are "sets of rules, decision-making procedures, and programmes that define social practices, assign roles to the participants in these practices, and guide interactions among the occupants of individual roles" (Young, 2002 p.5). In terms of scholarly *institutions*, one can, for example, think of the scientific method as a kind of social practice (and, hence, a scholarly *institution*) along with the various institutions accompanying science that define the roles of scientists and their interactions. *Organisations*, on the other hand, are, in Young's terms, "material entities with employees, offices, equipment, budgets, and (often) legal personality" that can be thought of as "players whose activities are guided by the rules of the game of institutions in which they participate" (Ibid). Scholarly *organisations* would then include specific universities, colleges, vocational and technical institutes (among others).

The central thesis being advanced is that specific forms of institutional innovation in research that can support transitions to new production systems are possible in light of both the opportunities and limiting conditions implicit in existing institutional arrangements and organisational players. The historical and contemporary cases examined below of multi-sectoral scholarly organisations established outside the traditional academy illustrate the capacity of large scale systems to creatively innovate across organisational and geographic boundaries. These new organisations build on resources from multiple types of existing organisations including financial resources, but also conceptual and other in-kind resources. At the same time, an examination of the process or pathway of their formation illustrates significant constraints in the development of their modes of research, methods of disseminating this research, and mobilisation of resources to support this research.

¹ An earlier presentation of this chapter was given to the Department of Geography and Regional Science at the University of Graz, Austria, on November 3, 2011, under the title "Building from Within and Beyond Universities to Create New (and Sustainable!) Production Systems". I would like to especially thank Dr. Zinaida Fadeeva and Dr. Unnikrishnan Payyappallimana for their very helpful suggestions and editing of this work.

RCEs, The Royal Society of London, and the Trilingual College of Leuven

The relatively recent formation of the RCEs can usefully be compared and contrasted (from an institutional and organisational perspective) with earlier historic multi-stakeholder scholarly organisations characterised by the involvement of both academic and non-academic leadership in their formation. These organisations – while associated with universities and retaining academic freedom – act outside their traditional structures and powers. They would also be notable for pioneering new modes of knowledge production and dissemination enabling the transformation of existing systems of production in a period of crisis. These new models of knowledge production would subsequently be formally incorporated within the institutional frameworks of higher education organisations once their scholarly merits and social and economic benefits had been demonstrated. While a number of such organisations might be considered, two historic examples notably meet these criteria. The *Royal Society of London for the Advancement of Natural Knowledge* founded in 1660 was a self-governing fellowship that included but was not restricted to university scholars and that pioneered the scientific method (see Box 1). Associated with the rise of this scientific knowledge was a range of technologies central to the industrial revolution beginning in the mid-18th century in the United Kingdom. An earlier historical innovation in scholarly organisations is found in the development of the Trilingual College (*Collegium Trium Linguarum/Collegium Trilingue*) of Leuven, Belgium, in 1517. The Trilingual College is credited with advancing the rise of humanism with its broad organisational and cultural impacts (see Box 1). The innovations in knowledge production of the Royal Society and Trilingual College subsequently became incorporated in higher education organisations, so it is now commonplace for universities to have specialised departments in both the sciences and humanities.

Box 1. The Trilingual College of Leuven and the Royal Society of London

The Trilingual College of Leuven (Belgium): Established in 1517 through funds bequeathed by Jerome Busleyden and under the leadership of the famed humanist Desiderius Erasmus, the Trilingual College provided an open model of professional instruction in the three languages of classical Latin, Greek, and Hebrew. While reviving biblical scholarship and theology through critical textual study of religious scriptures in their original languages and historical context, it also gave scholarly access to accurate readings of other ancient texts including classical literature, biology and law. Also called the Collegium Buslidianum, Collegium Trilingue, Collège des Trois Langues, or College Dry Tonghen, the Trilingual College of Leuven advanced humanism with its emphasis on the mastery of spoken and written language and an understanding of the nature of human beings to help advance their intellectual, ethical, and spiritual development.

The Royal Society of London for Improving Natural Knowledge: Established in 1660, the Royal Society pioneered the development of the scientific method under the leadership of notable individuals such as Robert Boyle, Sir Christopher Wren, and Sir Isaac Newton. In addition, the Royal Society pioneered new forms of scientific instrumentation in developing controlled experiments. Notable for the development of the first scientific journal, *Philosophical Transactions of the Royal Society*, the scientific method the Royal Society pioneered is now a formal part of higher education and other research organisations. Its scientific discoveries also contributed greatly to technological developments of the industrial revolution.

In considering points of comparison, one important commonality between RCEs, the Royal Society, and the Trilingual College that will be discussed has been the participation of scholars and higher education organisations in their formation, yet in ways that innovate beyond the traditional academy. These three organisations can, at the same time, be usefully contrasted given the differing role played by other institutions and organisations in their creation. A listing of different institutional forms supporting distinct organisational types is provided in Table 1. The listing reflects the historic emergence and institutional dependence of each, beginning with volunteerism as the chronologically most recent institutional form to emerge, working back to those that emerge in earlier time periods. To illustrate this point, the earliest voluntary sector organisations that emerge in the 19th and early 20th century (for example, the YMCA or Scouting), become institutionally possible where individuals in society are freely and legally able to associate and mobilise resources around socially desirable causes. This freedom to associate emerges with the rise of modern democracies and rights of citizenship. It also relies on legal powers of incorporation associated with the market where entities (such as for-profit corporations with limited liabilities and, now, not-for-profit corporations) have legal standing as persons under the law. The development of market organisations is earlier than the voluntary sector with merchants and their commercial activity evident, for example, in medieval Europe (see Zacour, 1976 p. 39-67). Such market activity, in turn, depends on institutional frameworks (such as ownership of private property and contract law) made possible by governments/states (such as monarchs) and their imposition of codified laws and judicial systems over large territories. Other contemporary institutions and organisational forms with which we are quite familiar, such as aristocratic or religious forms, have even earlier origins with distinct purposes and traditional modes of governance.² It should be noted, however, that these earlier forms may take advantage of contemporary institutional frameworks to advance their interests and build their capacities, so that a mosque or church may become legally incorporated and make use

of the freedoms made possible by a robust citizenship (such as freedom of belief and association) analogous to organisations in the voluntary sector.

Table 1. Listing of Institutional Forms and Associated Organisations

Institutional Form	Examples of Associated Organisations
Voluntary	Not-for-profit corporations, voluntary associations
Market	Private businesses, co-operatives
Governmental/State	National & provincial/state governments, city/municipal governments, international governmental organisations (e.g., the UN)
Aristocratic	Nobility/aristocracies and specialised craft guilds/professional associations
Religious	Faith organisations (e.g., temples, synagogues, churches, mosques)
Family	Immediate and extended families

If one examines the primary institutional processes and concepts being employed by each multi-sectoral scholarly organisation, it will be argued that RCEs principally apply volunteerism and institutions of the voluntary sector to advance new forms of research and scholarship, while the Royal Society historically applied market institutions and concepts in developing science, and the Trilingual College applied state/governmental institutions and concepts in advancing humanism. They also apply these institutions (volunteer, market, and governmental, respectively) to their governance structures. At the same time, a critical set of research questions and resourcing for each organisation initially seem to be associated with those organisations providing social supports and maintaining social order in the given time period of their creation. In this case it will be argued that governmental organisations (city governments, provincial, national and also international governmental organisations such as the United Nations) have played this role with RCEs, while the Royal Society relied on the support of the aristocracy, and the Trilingual College on religious organisations, specifically the Christian

² Though it won't be argued here, the remaining institutional forms in the table can, in turn, be seen as having their historic roots and institutional dependence on the earlier form listed in the table beneath it. The last four forms (state, aristocratic, religious, and family) likely parallel the political organisations identified by anthropologists (namely: states, chiefdoms, tribes, and bands) and the institutional developments associated with each form. For an anthropological overview of these see Ember and Ember, 1996 p. 431-439.

church.³ At the same time, the innovations of these multi-sectoral scholarly organisations receive some support and have substantial benefits over the longterm for the dominant productive sectors of the day.⁴ Many RCEs, it will be argued, are concerned with issues of livelihood and while it is still early on in their formation some are conducting research to advance sustainable livelihood opportunities and sustainable production and consumption in their regional market settings; the Royal Society, on the other hand, despite its reliance on market and aristocratic institutions and organisations in advancing science, contributed extensively to the power of state organisations, while the Trilingual College, though relying extensively on state and religious institutions and organisations had lasting humanising impacts on the aristocracy.

The three cases (RCEs, the Royal Society, and the Trilingual College) have been chosen, in part, for (1) the scholarly treatment each has received to date, (2) their documented transformative impact on the productive capacity of their societies in their given time period, and (3) their institutional positioning and dynamics enabling worthwhile inter-organisational comparisons and contrasts (as noted above). The cases being conducted should not be taken as a survey of all innovative multi-sectoral scholarly organisations that have historically transformed or are transforming knowledge structures in various regions in other parts of the world and in other time periods (both historic and contemporary).⁵ A future study of these additional cases in comparison to those treated here would usefully shed light on additional organisational parallels and differences.

New Multi-sectoral Scholarly Partnerships: The Role of Higher Education

An important commonality between the three multi-sectoral scholarly organisations under consideration is the participation of higher education organisations in their formative development. The *Trilingual College* relied on the scholarly support of the University of Leuven while the *Royal Society* relied on the initial support of Gresham College, London, and RCEs on the United Nations University (UNU) and higher education partners within their respective regions. Given the significant impact of research and innovation on production systems, the role of scholarly institutions and formal education organisations in these earlier organisations is perhaps not surprising. In the case of RCEs and their goal of advancing sustainable development, innovation has also been identified as playing a central role. The *Millennium Ecosystem Assessment* (MA) views science (and the technology derived from science) as a key driver of change in relation to its impacts on both human well-being and ecosystems, both central to sustainable development (MA, 2005 p. 66-67). Higher education organisations have an important role to play in affecting science and technology as a driver of change in light of their capacity to generate new research and educational practices and to dedicate material resources to research as part of their traditional functions and purposes.

These higher education partners share the characteristic of having themselves had earlier structural commitments or mandates (typically at their formation) to serve their respective communities in meeting specific community needs (see Box 2). From the perspective of scholarly capacity, the participation of higher education organisations in each multi-sectoral scholarly partnership

³ Interestingly, each of these organisations posing research questions and providing resourcing is at an institutional level two earlier than the form inspiring the new mode of scholarship and governance structure (see Table 1). For example, while volunteerism inspires the new form of scholarship and governance model of RCEs, governmental organisations (two forms earlier in Table 1) have helped frame research questions and provide resourcing for RCEs.

⁴ In Table 1, these dominant production forms are located between the newest institutional form at the time inspiring new forms of scholarship and the institutional form providing initial resourcing and general research questions. For example, in the case of RCEs and in the current time period, market institutions and organisations shaping the dominant system of global production are located between the voluntary and the state sector.

⁵ Even in the case of the Trilingual College of Leuven, there were also a number of other colleges that emerge in the same time period with similar goals including Corpus Christi College in Oxford founded by Bishop Richard Fox in 1515 focusing on teaching the two languages of Latin and Greek, the School of Alcalá in Spain supported by Cardinal Ximenes that modeled its school of languages after the Trilingual College, and the Collège de France founded by Francis I in Paris (DeVocht, 1951 vol. 2, p. 353-356, 360).

play an important role in legitimising new forms of scholarly activity not yet formally accepted within the traditional academy. This allows the participation, recognition, and support of students and professors in a new scholarly enterprise. At the same time higher education's participation helps assert a culture of academic freedom in these partnerships, more specifically a capacity for investigator driven research, something typically constrained in moments of broad social resource constraints associated with each of these periods of institutional innovation.

Box 2. Tradition of Community Service of University Partners

Trilingual College:

University of Leuven (est. 1426): one of the first universities jointly established by a pope (Martin V) and a sovereign (Jean IV, Duc of Brabant) to provide a service to students in northern Europe who previously had to go to Paris for their education (Neve, 1856 p. 6).

Royal Society:

Gresham College (est. 1597): professors historically gave free public lectures in the city of London with professor salaries derived from rental income from London properties (Gresham College, 2012).

RCEs:

United Nations University (est. 1973): mandated by the UN General Assembly to be "an international community of scholars...in furtherance of the purposes and principles of the Charter of the United Nations" with a current focus on implementing "research and educational programmes in the area of sustainable development, with the particular aim of assisting developing countries" (UNU, 2012).

The Role of the Most Recent Institutional Forms in Creating New Scholarly Partnerships

In forming the new multi-sectoral scholarly organisations under consideration, each creatively applies ways of knowing, productive practices, and institutional forms associated with the latest or newest type of organisation in a given time period (such as volunteer organisations in our own time period). By applying the most recent institutional form to pressing research problems of the day, this creatively generates new epistemologies, new ways

of conceiving human and natural systems, new scholarly governance structures enabling new forms of knowledge production (including new research methods), and new forms of knowledge dissemination and technology. In the case of the Trilingual College of Leuven we see the application of *state or government ideas* to pressing research questions of the 16th century; with the Royal Society we see the application of *market ideas* to address research questions of the 17th century; and lastly, with the RCE network we see the application of *voluntary sector ideas* to address pressing questions of sustainable development of the late 20th early 21st century. Each will be discussed in turn.

In the case of the Trilingual College the state idea of the centralised will of a king or government shaped the College's structure; in this case the College was literally determined by the dictates of the *legal will* of the late cardinal Jerome Busleyden (d. 1517) expressing his personal will, plan, and intentions for the College (DeVocht, 1951 vol. 1, p. vii-ix). Later the terms of this will acted as a legislative constitution for the College (ibid, vol. 1, p.6). Ideas of state autonomy were also implicit in how texts were to be studied. Classical texts on their own were treated as autonomous objects of study from which to derive evidence, rather than relying on "the word of the master" (ibid, vol. 1, p. vi, 239). In turn, inferences were made from an accurate reading of these texts to other subject areas (such as theology) or to one's personal life (in applying their humanising ethic). Students as autonomous learners were also able to choose whether or not to attend these freely offered courses as they were not part of the set curriculum (ibid, vol. 1, p. vi). Through personal study students were also expected to employ their own autonomous reasoning when examining texts (ibid).

Market ideas are also creatively employed in the formation of the Royal Society and the practice of science. Knowledge is generated to meet the needs of society – to be useful – yet without judging the moral, social, or political preferences their might be for this knowledge (see Shapin, 1996 p. 13). Here the dispassionate market assessment of the merchant is reflected in the objectivity sought by science; this is further enabled by a mechanisation of scholarly methods that sought to eliminate the role of human passions and interests (ibid). Artificially contrived experiments were intended

to produce new experiences with “quality control” of the emerging factual claims (ibid, p. 88). These particular experiences and facts were taken as givens and foundations from which to inductively infer the theories of natural philosophy (ibid., p. 90). This is akin to the merchant taking market supply and demand as givens separate from economic theories explaining underlying market preferences and behaviour. Artificially contrived scientific experiments involved control, calculation of probabilities, the removal of subjective measures, and the seeking of regularities expressed in the language of mathematics (ibid., p. 61, 96-101). These are akin to the quantitative mathematical measures associated with market pricing and market calculations of risk and profit associated with the sale of a product. The development of the Royal Society’s scientific journal, aptly entitled the “*Philosophical Transactions of the Royal Society*”, was also conceived on a for-profit model.

Similarly, the RCE network creatively employs ideas associated with the *voluntary sector*. The concept of *Sustainable Development* can be viewed as a *political concept* (Baker, 2006 p. 27) “volunteered” by the broader society as a result of political policy processes (see, for example, WCED, 1987; see Annexe 2, p. 352-387). In forming RCEs, organisational partners freely associate to advance the cause of ESD while its regional boundaries are “volunteered” by ecological, cultural and livelihood factors affecting community interest in participation. RCEs locally and globally also self-structure to network on common sustainability themes (see, for example, Dahms, et al., 2008 Table 2, p. 389). RCEs are required to mobilise most of their own resources necessarily requiring voluntary contributions by an RCE’s partners.

The openness required for voluntary resource mobilisation extends to RCEs adopting inclusive theoretical perspectives in their forms of knowledge production. These inclusive forms include social learning, meta-learning (involving inter-personal learning between different groups), pluralistic approaches, transdisciplinary and/or problem-based approaches, and those involving learning by doing (Petry et al., 2010 p. 85). The research methods employed reflect an epistemology based on volunteerism that mobilises conceptual resources in particular, grounded contexts, especially where there are a large number of variables and significant unknowns.

In such grounded methodologies (see Charmaz, 2004), communities themselves help shape the research enterprise by informing the concept of sustainable development, volunteering their own definitions and meanings found when attempting to understand human well-being within a given local context; indigenous and other forms of local knowledge related to human self-understanding and ecosystems also supplement existing scientific knowledge. Organisational and individual members within the RCE region, both formal scholars and community members, are similarly mobilised in a participatory way to contribute their own disciplinary and organisational understandings to the research endeavour. The transformative social, cultural, economic and environmental impacts of this research can then be a basis for further study. A grounded *case studies* approach (see Berg, 2007 p. 283-287) is frequently used by RCEs to the extent sustainable development strategies, especially those advancing livelihoods in particular regions, are context sensitive. Comparisons between such case studies can be applied at a variety of temporal and geographic scales, whether within or among RCEs.

The Participation of Well Established Organisational Forms: the Church, Aristocracy, and the State

In addition, each multi-sectoral scholarly partnership being examined also receives early support and scholarly objectives tied to well established organisations from the respective time period; these organisations have a prominent role in providing social supports and maintaining social order. In the case of the Trilingual College this role is principally played by religious organisations, more specifically, the Christian Church while in the case of the Royal Society this role is played by the aristocracy and in the case of RCEs and contemporary society this role is primarily played by the state or government (for example, in terms of its social welfare functions, role in providing public infrastructure, and policing). In the case of religious support for Trilingual College Jerome Busleyden who posthumously financed the College had an extensive career in the church serving as a parish-priest, Archdeacon, ecclesiastical councillor, and canon (DeVocht, 1951 vol. 1, p. 2; Neve, 1856 p. 42). Five of the six executors of his will also had ecclesiastical careers or were associated with church-supported educational organisations (DeVocht, 1951 vol. 1, p. 50-55),

the latter being something quite common in the medieval period (Shapin 1996, p.126); the formative leaders of the College in its early stages, such as the famous humanist scholar Desiderius Erasmus, also had backgrounds in the Christian church. The Royal Society, on the other hand, relied considerably on the aristocracy, with resources from self-financed gentlemen scientists and offices held by prominent lords, barons, and knights (such as Lord Brouncker, Sir Christopher Wren, Sir Isaac Newton, and Robert Boyle; Shapin 1996, p. 134-135). Membership was comprised principally of lords, civic gentlemen, and those of a higher social standing (*ibid*, 135) with a considerable cost for membership in later years.⁶ The United Nations University RCE initiative has received direct and indirect support from governments at various levels (national, provincial/state, regional governmental authorities, and city/municipal governments). The United Nations University is principally supported by individual national governments that provided 77.8% of its funding in 2011 (UNU, 2012b, p. 65) with its Education for Sustainable Development Programme supported by the Government of Japan. Individual RCEs, in turn, have relied, in some cases on the financing and in-kind support of individual national governments. Some, on the other hand, rely on support from other levels of government such as municipal/city governments, state or provincial governments, and, in some cases, regional governmental authorities. Indirect government support is also evident in the role of national and state funded universities, colleges, and technical institutes as leading partners of many RCEs (though, in this mediated case, there may be no intentional support by the state). It should be noted, that RCEs as self-organising multi-sectoral regional entities also frequently receive support from non-governmental sources.⁷

Central research questions to be investigated by each new scholarly partnership also have been shaped by these organisational sectors with the goals of the Trilingual College reflecting extensively (though not exclusively) religious interests, the Royal Society reflecting concerns of

the nobility, and the RCE initiative reflecting sustainable development research questions raised by governments. In the case of the Trilingual College, scholars were meant to study the three languages of Latin, Greek, and Hebrew to help understand the books of the Bible in their original languages and the writings of the early Church Fathers along with the classical cultural context in which these texts were written (DeVocht, 1951 vol 1, p. 305, 309-310). Direct access to the original texts was viewed as allowing for a solid linguistic interpretation and textual criticism that would overcome the errors of translators and copyists and, in turn, provide a preparatory basis for (and enhanced study) of theology (DeVocht, 1951 vol. 1, p. vi, 297, 304, 345). Jerome Busleyden, its founder, wrote that the College was meant to “bring glory to God and to the Church” (*ibid*, vol. 1, p. 23). With the Royal Society, the aims of the aristocracy were reflected in its traditional concerns for discovery of what was new, peculiar, rare, or unusual. This interest in what was new and rare was reflected in the “cabinets of curiosities” fashionable among European gentlemen of the time (*ibid*, p. 90). The Royal Society’s aims had been partially inspired by the writings of the Sir Francis Bacon that contained a general optimism about the possibility of discovering new knowledge (Shapin 1996, p. 20).⁸ The Royal Society’s aims also reflected the interests of the nobility in what was hidden and secret. Aristocratic society at the time, for example, was fascinated with constructed automatons that through internal mechanical movements imitated human activities (*ibid*, 158).⁹ Just as the mechanical clocks (also popular at the time) visibly showed the movement of a clock’s hands while its inner workings were typically hidden, it was felt that the natural features of humans and animals (including their movement, digestive, and respiratory systems) and features of astronomy could similarly be explained by otherwise hidden mechanisms (*ibid*, 32-36). From the perspective of scientific research, this meant going beyond mere appearance and commonly observable qualities to discover the hidden secrets of nature explained in terms of fewer and more basic qualities, frequently different from

⁶ An example of this continued reliance on the aristocracy is an attempt by the president of the Royal Society in the 1780’s to exclude “the less socially prominent and those with republican leanings” (Jacob, 1988 p. 155, 161).

⁷ RCEs often mobilise resources (both in-kind and financial) through organisational partners redirecting and re-aligning their resources to ESD initiatives (versus financing the RCE directly as an external, separate entity).

⁸ This included Bacon’s 1620 work *Instauratio Magna* (“The Great Instauration”) and 1624 work *Nova Atlantis* (The New Atlantis); *ibid*.

those experienced in common experience (ibid, 52-53). It also meant developing specialised instrumentation that required focused training (such as the microscope and telescope) to extend and improve the human senses (ibid., 19, 93). The interest of the aristocracy in individualism and yet also, at the same time, maintaining the social order and preventing radical reform could be usefully advanced by science. Science, on the one hand, powerfully challenged previous knowledge that had been accepted purely on the basis of authority and tradition; at the same time it provided a new commonly acceptable platform for knowledge (for those willing to follow the scientific method), one not prejudiced by religion and politics – topics not allowed for discussion at meetings of the Royal Society (ibid, 135; see Jacob, 1988 p. 78).¹⁰ Lastly, the goal of sustainable development, and more specifically of RCEs reflects the interests of national governments that have made various national and international commitments to ESD reflected in their decision to create a UN Decade of Education for Sustainable Development (2005-2014) in December 2002 (United Nations, 2003). It is in support of this Decade that the United Nations University undertook the RCE initiative. State governments also have constitutional and other legal responsibilities (1) to regulate, conserve, and protect environmental systems, (2) to promote literacy and support public education, and (3) to meet social responsibilities to the poor and the general citizenry through social welfare systems and employment generation. These three goals are implicit in the concept of ESD that simultaneously seeks to promote educational strategies to advance human well-being and healthy ecosystems.¹¹

The institutional culture of each of these three organisational forms also helps shape the structure of each new partnership (see Box 3).

Box 3. Role of Institutional Cultures in Shaping New Structures

Trilingual College and Religion

Religious concerns with ethics found in the view that humanist studies helped develop one's virtue (DeVocht, 1951 vol. 1, p. 304).

Religious concerns with inclusivity reflected in the Trilingual College offering free lectures open to the entire university and some student support for food and accommodation tied to academic merit versus family connections (ibid, vol. 1, p. 5, 13).

Royal Society and Aristocracy

Royal Society conceived as a *fellowship* and *society* of gentlemen Civility of this society instrumental in overcoming the disputational and factional nature of the academic community prevalent at the time (Shapin, 1996 p. 122, 134).

RCEs and Government

RCEs conceived as “centres” of expertise within their regions that help to identify, map, and coordinate research in ESD within their regions with periodic reporting to the United Nations University.

Degree of centralised facilitation and planning over the short and long term around locally identified sustainable development issues.

RCEs able to facilitate targeting of funding and regional alignment of other resources for strategic purposes related to their ESD agendas, akin to centralized state administrations.¹²

Despite these organisational influences on the culture of the new scholarly structures, the cultures of each supporting group (church, aristocracy, and state government respectively) is also creatively challenged. New forms of inclusiveness push the boundaries of

⁹ An early 18th century lecture by Marin Clare to the Royal Society focused on “the history of automata...on the circulation of the blood...[and] on magnetism” (Jacob, 1988 p. 146).

¹⁰ Other scholarly pursuits in the Royal Society were tied to earlier interests of the nobility such as attempting to turn base metals into gold and the art of flying (Shapin 1996, 140).

¹¹ Governments also aim to create conditions for their leaders (and citizens more generally) to exercise power and planning over the long term requiring relative stability or, at least, predictability. These long term time horizons are also implicit in sustainable development's focus on meeting the needs and aspirations of future generations.

¹² It should be noted, however, that the wealth of RCEs typically resides in their ability to mobilise in-kind resources.

their traditional domains enabling innovation. While religion plays a key role in reinforcing ethnicity and culture, the Trilingual Colleges challenged Western Europe by introducing the study of classical Latin along with Greek and Hebrew which enabled a re-interpretation of the meaning of religious scriptures and a rediscovery of classical, pre-Christian culture. At the time, the examination of the Bible in its original Greek and Hebrew was viewed as challenging the authority of the Latin version of the Bible commonly in use in the West (the Vulgate) while there was considerable hostility to studying non-Christian classical literature viewed as pagan (DeVocht, 1951 vol. 1, p. vi, 5, 296-297). The Royal Society advanced not only the specialised interests of the noble elites, but initially focused on the scientific study and refinement of the skills of ordinary craftspeople (Shapin, 1996 p. 139). Finally, RCEs due to their novel geographic boundaries (shaped by ecological regions, livelihoods, transportation, and cultural patterns) typically cut across traditional political jurisdictions; this requires the networking of multiple scales of governmental authorities (including cities, rural municipalities, states/provinces, countries, and international governmental bodies such as the United Nations). At the same time, the interdisciplinary nature of ESD requires ongoing inter-departmental networking within each government. Lastly, any centralised direction of RCEs is always in the context of being attentive to what is desired in a region around ESD; given RCEs' governance basis in volunteerism, this requires gentle, facilitative leadership that empowers and links partner organisations around common research efforts.

Institutional Support at Larger Geographic Scales: Bishops, Parliament, and the UN

One of the primary strengths of these new multi-sectoral scholarly organisations is their ability to generate new knowledge based on integrating information, research, and knowledge dissemination over larger geographic scales. This scholarly activity over larger territories is enabled by a further kind of organisational involvement, specifically organisations operating at larger geographic scales yet associated with each of the previously mentioned institutional forms (church, aristocracy, and state) in the given time period. In the case of the Trilingual College of Leuven, its history is connected with the support of higher religious offices such as bishops and their role in geographically integrating larger ecclesiastical

territories. For example, not only is Jerome Busleyden's ecclesiastical career an example, but his elder brother served as the Archbishop of Besançon (DeVocht, 1951 vol. 1, p.2). The Bishop of Vienna, a friend of Erasmus, establishes his own trilingual college (to which he donates his library), while a further friend of Erasmus, Richard Fox, the Bishop of Winchester, establishes Corpus Christi College in Oxford on a humanist foundation (ibid, vol. 2, p. 356). The Royal Society, on the other hand, is associated with the national institutions of Parliament (comprised of the House of Lords (including representation of the nobility) and the House of Commons). The inspiration for the Royal Society was tied to a period of civil war against the king with support for parliament and non-absolutist government at the time being shared among natural philosophers and others engaged in scientific experimentation (Jacob, 1988 p. 75, 93). Margaret Jacob sees "the natural philosophy inherent in [Sir Isaac] Newton's science as the metaphysical foundations of the Whig constitution" (ibid, p. 138). Sir Isaac Newton himself was later a member of parliament. Finally, the RCE initiative is a global initiative through its institutional dedication to the goals of the United Nation's Decade of Education for Sustainable Development and the institutional direction and support of the United Nations University; here the UN can be thought of institutionally as a government organisation to the extent it acts as a "government of governments". These organisational forms operating at a larger geographic scales (whether a bishop's diocese versus a local parish, a national House of Lords versus the land holdings of a local lord, or the global UN system versus an individual national government) provide not only support and protection for these new forms of scholarship, but also a general form of social legitimation. In the case of RCEs, for example, the importance of their association with the United Nations often plays a role in the ability of RCEs to mobilise support in their respective regions and to network internationally. In addition, these larger organisational forms also assist in generating important questions that can be addressed by the new forms of scholarship afforded by these scholarly partnerships. The humanist scholarship of the trilingual colleges provided important scriptural knowledge to inform ecclesiastical debates, especially those associated with the Protestant Reformation of the 16th century. The scientific scholarship of the Royal Society was brought

to bear in addressing questions raised by parliament and its government agencies (Jacob, 1988 p. 92). RCEs are structured to address research questions raised by the UN Decade on ESD while RCEs are also poised to address specific questions raised by UN agencies such as UNESCO, UNICEF, and UNDP, among others.

The larger geographic scales afforded by the association of these new scholarly partnerships provides a distinctive platform for innovation and resource sharing that would otherwise not be possible at such a scale (see Box 4). Lastly, the institutional dynamics of these organisational forms operating at larger territorial scales also seem to be somewhat emulated within these new scholarly partnerships. For example, the Trilingual College innovates with the formation of specific financed academic chairs in each of the 3 languages (DeVocht, 1951 vol. 1 p. 13); these chairs perhaps reflect the cathedra (Latin for “chair”) or the bishop’s throne that symbolised the bishop’s authority to teach. The Royal Society structured itself as a self-governing fellowship with a presidency, perhaps emulating the workings of a Parliament with its own Prime Minister. The UN culture and structure are evident in Global RCE meetings that occur annually while some RCEs are notable for employing UN concepts, such as having “general assemblies”, within their regions. The culture of the UN associated with its being a non-European, post colonial, global institution also contributes to the potential for RCEs to have a more inclusive approach to knowledge production.

Box 4. Platform for Innovation Enabled by Larger Geographic Scales

Trilingual College of Leuven: able to attract scholars to northern Europe from southern Europe (esp. Italy) having a greater proficiency in classical languages.

The Royal Society of London: engaged in scientific studies linked to national exploration and colonisation by England.

RCEs: able to collaboratively engage in interdisciplinary, transformative research grounded in diverse livelihood and ecosystem settings across the globe under the auspices of the United Nations and UN University.

Openness and Support for Organisations Engaged in Dominant Production Systems

The previous analysis has shown the key institutional and organisational role of higher education in these multi-sectoral scholarly partnerships, the innovative use of ideas and institutions from the newest institutional sector of the time in devising their models of research and scholarly governance, and the role of those organisations engaged in providing social supports and maintaining the social order (and their counterparts operating at larger geographic scales) in devising research questions and providing initial supports. Yet these multi-sectoral scholarly partnerships are also noteworthy for their openness to the participation of further organisational forms, particularly those engaged in the dominant forms of production during the time period and their longterm impact on these sectors. The humanist education of the Trilingual Colleges appealed to members of the aristocracy, administrators, and other professionals. The Royal Society formally engaged state power, specifically that of the monarchy, when King Charles II gave it a Royal Charter. The Royal Society also had significant benefits for both governments and the merchant class with the advent of the industrial revolution. Finally, RCEs themselves are notable for their diverse participation that includes small, medium, and large businesses and cooperatives, non-governmental organisations, schools, faith organisations, and members of the general public.

It should be noted that specific benefits were thought to accrue to those organisations engaged in the dominant production systems of the day by the respective founders of the new scholarly partnerships. Erasmus in his work “The Education of a Christian Prince” (1516) extolled the virtues of a humanist education for the aristocracy at a time when universities were primarily dominated by priests and other church officials. In terms of supporting aristocratic values, Erasmus and others viewed the study of classical languages as promoting eloquence and the “pleasing expression” of ideas (DeVocht, 1951 vol. 1, p. 157), something that would benefit those of higher social standing. In addition, a humanist education was thought to create virtue and produce civic utility through the direct study of religious scriptures and other classical works that offered practical ethical instruction (Shapin, 1996 p. 127). Nicolas Vernulaeus noted the success of the Trilingual College stating “There has not been during these hundred

years in any part of the commonwealth any one of any renown or any doctrine, who has not been a disciple in this [Trilingual] College, which is in fact the *Palaestra* of Princes, of Nobility and of Great Men" (cited in DeVocht, 1951, vol.1, p.1). In the case of the Royal Society, Sir Francis Bacon whose work "The New Atlantis" (1627) envisioned scientific inquiry and inspired the formation of the Royal Society, viewed the rise of science as having significant benefits for the state. In this work, the king of an imagined land establishes "Salomon's House" that does research to extend natural philosophy (science) and expand state power. In this imagined house scientific labs were populated by government officials (Shapin, 1996 p. 130). Despite relatively minimal support of the monarchy for the Royal Society in its early stages, the Royal Society proved to have significant benefits to the state akin to those envisioned by Bacon. Its scientific discoveries in geography and navigation advanced British military power and trade, specifically at sea (see Jacob, 1988 p. 64). Scientific innovations also helped advance industry and agriculture with new mechanical devices, which, in turn, produced wealth that was deemed to promote general utility that, in turn, supported social order (ibid, p. 30-31, 92). Science also provided a basis for shared beliefs after Europe's centuries of religious sectarianism (Shapin, 1996 p. 122-125). The RCE network in its early stages has also sought to advance sustainable development for businesses. This has included specific work at its global conferences focusing on the topics of sustainable consumption and production (SCP) as well as specific initiatives in this area at a regional level to create market opportunities (as discussed earlier in this volume). More generally, the RCE Network has significant opportunities for benefiting business. Education for sustainable development helps shape consumer preferences, creating markets for new green products and services. This transformation in understanding also enables the competitive success of new small and medium sized enterprises (SMEs) focusing on sustainable development in otherwise saturated markets. In addition, sharing knowledge about sustainable development activities in regions allows innovation in production methods and materials, many having market applications. More critically, RCEs enable the costs of innovation and risks to be shared not only by business but also by the range of organisations participating in the RCE and volunteers with appropriate expertise from the broader community. The focus of

sustainable development on sustaining human and natural capital over the long term is vital for business given that its physical capital (such as building, equipment, and vehicles) and most of the energy used to power this equipment is ultimately derived from natural capital stocks; on the other hand, sustaining human capital is the backbone of the knowledge based economy and a productive workforce.

Benefits to Newer Organisational Forms

It should also be noted the benefits that each multi-sectoral scholarly partnership has had for those organisational forms that were the newest or the most cutting edge in a given time period: in the case of the Trilingual College, the growing role of the state and government, in the case of the Royal Society, the emerging productive role of business, and in the case of RCEs, an increasing productive role for the not-for-profit or voluntary sector. In the case of governments, the study of Latin and Greek through the Trilingual College was important in understanding elements of earlier judicial systems of the Roman Empire (such as the *Codex Justinianus* and the *Codex Theodosianus*), which, in turn, was important to the revival of the study of law in the West and the rise of state authority (DeVocht, 1951 vol. 1, p. vi). Students of the Trilingual Colleges also filled the demand for secretaries and advisers to the state and demand by towns for schoolmasters (DeVocht vol. 1, p. 239). In the case of the Royal Society, from 1660 there had been a commitment of the Royal Society to be useful to trade and industry which included developing the scientific knowledge needed for many significant industrial innovations (Jacob, 1998, p. 130). Its success is perhaps reflected in there being more than 100 working steam engines in Britain by 1730 (ibid). Finally, RCEs, with their emphasis on sustaining human well-being and ecosystem health as goals of sustainable development, can play a central role in advancing the objectives of not-for-profit human service agencies and environmental non-governmental organisations. In doing so RCEs also build community capacity for increased volunteerism.

Innovations in Knowledge Sharing

With new forms of knowledge production also come innovations in the forms of knowledge dissemination. In terms of codified knowledge, the Trilingual College advanced the authentication and publication of complete

classical works versus earlier incomplete compilations (DeVocht, 1951 vol. 1, p. 191); old manuscripts in European libraries were also itemised and catalogued, a practice of Busleyden (the College's benefactor) during his lifetime (ibid, vol. 1, p. 3-4). Experiments of the Royal Society were recorded in minute detail to enable replication by others; these scientific materials, methods, and findings were then published in the first scientific journals (Shapin, 1996 p. 107-108). RCEs routinely seek to document and study existing and evolving educational practices for sustainable development in their respective communities, finding ways to store and manage this content in on-line and other formats for a diversity of community users, both within and outside higher education. At the same time, each educational partnership develops new ways for sharing experiential or tacit knowledge. As previously discussed, the Trilingual College pioneered free lectures on languages that were open to all members of the university without these lectures being part of any set curriculum or being focused on a particular practical aim (DeVocht, 1951 vol. 1, p. vi). The Royal Society held performances of specialised experiments at Royal Society meetings where the audience acted as witnesses to these experiments (Shapin, 1996 p. 107). As discussed in this volume, many RCEs have taken a decentralised approach to knowledge production and are in the process of creating regional learning spaces where various alternative livelihood practices (tied to traditional knowledge, local community history, locally available materials, and learning opportunities associated within a given ecosystem) can be studied by multiple educational sectors (for example, school systems, universities, technical and vocational institutes, and the general public).

In terms of diffusion of new knowledge, what is notable is the relatively rapid rate at which this occurs in these new scholarly partnerships; this, in turn, proves their social usefulness. In the case of the Trilingual College of Leuven, Jerome Busleyden dies in August, 1517, and already by October of that year, Erasmus has engaged the executors of Busleyden's will to hire a professor of Greek and of Hebrew to give lectures at the university (DeVocht, 1951 vol. 1, p. 60). The publication of the first scientific journal, the *Philosophical Transactions of the Royal Society* begins within five years of its founding. Many RCEs within a year or so of their acknowledgement by the UN University have already established their own websites and content

management systems for documenting and sharing knowledge within their respective RCEs and between RCEs. Many also engage in mapping ESD projects in their region. In a short time period extensive work has also been done to create global portals for RCE knowledge sharing. Many traditional academic publications in established academic journals have also emerged from the work of RCEs.

Concluding Reflections

The previous analysis suggests that organisational innovation through the formation of new multi-sectoral scholarly organisations outside the traditional academy (such as the Trilingual College of Leuven, Belgium (1517), the Royal Society of London (1660), and the United Nations University's RCE initiative (2005)) have played (or in the case of RCEs potentially play) a central role in creating and formalising research and disseminating new forms of knowledge (in this case, humanistic knowledge, scientific knowledge, and knowledge for sustainable development respectively). These two earlier knowledge systems, in turn, played a crucial role in moving to new systems of production (such as the industrial revolution in the case of scientific knowledge). The Regional Centres of Expertise on Education for Sustainable Development share important institutional parallels with these two earlier multi-sectoral scholarly partnerships. This suggests that the global RCE network may play an important, if not essential role, in advancing sustainable development and sustainable production systems on a global scale. This includes the knowledge needed for the creation of green and socially just market economies. These historic parallels with earlier scholarly networks also point to the scholarly potential of the RCE initiative in pioneering new forms of knowledge production for higher education organisations including advancing their educational goals and those of other organisations (such as the United Nations). The preceding analysis suggests that considerable institutional complexity underlies these new scholarly partnerships. Such complexity possibly constrains the range of new forms of scholarly institutions that can emerge and be successful in globally advancing sustainable production systems in a timely, efficient, and effective way, especially in light of significant global institutional and resource constraints. Lastly, it points to the potential value of participation by a range of organisational sectors (perhaps, most especially, business and the voluntary sector) in

specific RCEs and the RCE initiative more generally in order to advance their own organisational productive possibilities through moving to new and more sustainable production systems.

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Moving Forward: Upscaling and mainstreaming learning towards more sustainable systems of production and consumption and enhancing livelihood

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Challenges of SCP Governance and the Role of Local Initiatives

As a result of international efforts, a 10-Year Framework of Programmes for sustainable production and consumption was included as one of the outcomes of the United Nations Conference on Sustainable Development (Rio +20) held in Rio de Janeiro in June 2012 (Box 1). This achievement, however significant, must be kept in perspective. Twenty years ago, Agenda 21 identified unsustainable patterns of consumption and production as the major cause of the deterioration of the global environment, particularly in industrialised countries. Ten years later, governments committed themselves to work on the 10-Year Framework of Programmes to support development of SCP and they documented this commitment in the Johannesburg Plan of Implementation. During the same year, the 57th session of the UN General Assembly adopted a Resolution declaring 2005–2014 as the United Nations Decade of Education for Sustainable Development (DESD). Education was acknowledged as critical in achieving sustainable development. Yet, the SCP framework remains poorly articulated with international and national commitments failing to match the urgency of the challenge. The very commitment expressed in the Future We Want outcome document of Rio+20 indicates this lack of concerted action and the voluntary nature of the framework.

RCEs, individually and collectively, can offer opportunities for business and non-business organisations to develop modes of production that sustain natural and social capital over long periods of time.

One can argue that significant efforts on the road to SCP have been developed by individual countries and regions. Indeed, many such efforts deserve appreciation. Still, one must agree that our development is governed by economic models based on growth that is tightly linked to the consumption of resources and where increased consumption – and, in modern circumstances, resource depletion, deterioration of ecosystems and quality of life for more disadvantaged – are the facts of life. Even some of the most ambitious efforts aimed at creating coherent and concerted actions might need significant strengthening. For example, in the case of the European Union (EU), EU-wide consultation on sustainable consumption and production conducted by the European Commission in the spring of 2012 illustrated major areas of concern. It appeared, for example, that SCP actions are attributed predominantly to individual sectors or groups along the supply chain, missing opportunities to stimulate innovations and developments that could be initiated in a partnership (e.g. between consumers and producers) and at the system level (e.g. innovations such as product-service systems). Approaches identified as critical in developing sustainable lifestyles remained largely outside of the consumer's sphere of influence and creativity, as the consumers, according to the proposed measures, remained largely at the receiving end of information provisions. Product design and delivery systems remain predominantly controlled by producers. Measures that would assist in charting the trajectories of the future, such as foresight activities or investigation of potential technology pathways, were also absent. Generally, the element of capacity development remained underemphasised in the proposed recommendations and thus resulted in a missed opportunity to give higher urgency to capacity development programmes for regulators and policymakers who deal with demanding and complex tasks (e.g. consistency of requirements leading towards a single market for sustainable products).

Box 1. From The Future We Want, draft Resolution submitted by the President of the United Nations General Assembly, 24 June 2012

“We adopt the 10-year framework of programmes on sustainable consumption and production patterns, as contained in document A/CONF.216/5, and highlight that the programmes included in the 10-year framework are voluntary. We invite the General Assembly, at its sixty-seventh session, to designate a Member State body to take any necessary steps to fully operationalise the framework.”

The question this book answers relates to the role of multi-stakeholder, cross-sectoral regional initiatives such as RCEs in pursuing SCP and sustainable livelihoods. With all the challenges of countries still unable to decouple economic growth and environmental destruction, facing rapid development, industrialisation, emigration of the population from rural areas, growth of megacities, food shortages, provision of basic services, increased world connectivity and more, what are the chances for us all to secure a decent quality of life? What could RCEs do in large countries transitioning into high industrialisation, such as the BRIC countries of Brazil, Russia, India and China, where a significant number of people move from subsistence production systems to more centralised and globalised forms of lifestyle in relation to food, energy, health care or housing? What could these constellations of partners do in conditions of rapidly accelerated changes underlying financial, economic and ecosystem crises? Most importantly, what would be the potential of networks of sustainability learning and practice in a situation where global governance systems for SCP are still at a stage where it requires significant progress in terms of conceptualisation, commitment and actions? We suggest that aspirations towards a more sustainable society based on principles of equity, well-being, ecosystems sustainability, resource efficiency, economic sufficiency and societal resilience cannot be completely realised solely through the aid of international frameworks or instruments. The critical component of developing more sustainable production and consumption systems requires focus on local action and learning that becomes a testing stone of national and international SCP visions

at the community level. Such initiatives become not only innovation and sustainable development nodes locally, they are to be the policy advocates and architects of the new regional, national and international SCP regimes. Experiences of communities such as RCEs, in addition to demonstrating abilities to address the need for development of the local SCP systems, show opportunities for growth that would eventually become the elements of the distributed sustainability governance system.

Local and global potential

Production and consumption systems and quality of life are impacted by the global markets and relations across global supply chains. Lifestyles are defined by tendencies to over-consume and lifestyle ideals promoted by mass media. Generally, consumption and production systems, both local and global, are intermeshed in the most complex fashion.

As demonstrated by the preceding contributions in this book from RCEs in Asia-Pacific, Africa, Europe, Australia and North America, the RCE global community is gradually becoming a significant player in developing and promoting expertise for a transition towards sustainable production and consumption and sustainable livelihood. At the level of the communities, the initiatives provide a “business case” for the key themes of SCP: working with innovative practices for a green economy (RCE Makana, RCE Delhi); development of high quality TVET education (RCE Greater Western Sydney, RCE Hamburg); identifying livelihood improvement opportunities (RCE London, RCE KwaZulu Natal, RCE Cairo, RCE Rhine-Meuse, RCE Greater Phnom Penh, RCE Lucknow, RCE Graz-Styria); creating locally relevant consumer education processes (RCE Kitakyushu); and pursuing opportunities for sustainable entrepreneurship (RCE Delhi, RCE Vienna).

Such emerging success is underscored by the key characteristics of the RCEs: their multi-stakeholder composition, experience with collaborative projects within and across the regions, and their focus on innovation and transformative learning. RCEs, individually and collectively, can offer opportunities for business and non-business organisations to develop modes of production that sustain natural and social capital over long periods of time. By engaging the knowledge and innovative

potential of the regions, including non-business partners, and by minimising and distributing risks, RCEs create new, strategically-oriented opportunities, not only in competitive modern markets but also through productive activities outside markets. RCE practices are facilitated by the ways RCEs develop, document and communicate knowledge and experiences using media – both traditional and social media – as well as academic and non-academic publications. Inter-RCE projects that address local SCP challenges and engage multiple partners also enable the development and sharing of tacit knowledge. Knowledge required for new SCP projects might be supported by new scholarly practices that rely on multisectoral consortia facilitated by RCEs – consortia where research questions, learning and innovations are undertaken by partners beyond academia.

Experience of RCEs engaged in local projects while partnering with RCEs in other regions creates a platform for developing knowledge about different local-global systems leading to more sustainable economies. Connections developed among RCEs within and across different continents provide a critical global dimension necessary for addressing the challenges of SCP and sustainable livelihood in the future, by providing deeper understanding of ongoing practices, systematic conceptualisation of possible paths towards SCP, fostering local and global policies conducive for developing sustainable societies and forging deeper synergies among processes and programmes that are focused on the issue.

With all its potential, the major challenge for the whole RCE community is to further build and deliver capacity important for SCP locally and, through collaborative actions with RCEs in other regions as well as with other critical partners, to build the global knowledge base for combating the consequences of current dominant ways of consuming and producing.

Enabling Multi-stakeholder Networks for SCP: The RCE perspective

The magnitude of today's challenges calls for the scaling up and mainstreaming of SCP and sustainable livelihood projects, bringing them to a stage where they turn from merely good practices to the standard benchmarks of operation, as well as networking with larger programmes at national, regional and international levels. This is a gargantuan task by any standards. The challenge is further aggravated by the dominant tendency of many sustainable development projects to limit themselves to short term and narrowly focused projects and avoid more strategic, long term engagement with the issue. While a wonderful diversity of individual innovations spring out of such a style of practice, more ambitious governance systems, transformative learning and actions require a different degree of effort in conceptual, strategic and action coordination. When searching for new forms of cohesive and ongoing coordination, a longer term perspective, stronger system orientation, focus on innovations, consistent stakeholder engagement, collective reflection on the results of the individual projects and their interplay with other activities need to be kept in mind. The growing experience in collaboration of the RCE network and successes of the work of the individual RCEs signal a stage when more consistent, collective efforts for conceptualisation of SCP and SCP learning, strategic consolidation of actions, and engagements with similar-minded networks could and should be seriously considered.

In the final sections of this chapter we would like to offer some initial ideas on scaling up and mainstreaming RCE actions through the development of the network's capacity, building alliances with others and engaging with relevant policy processes.

Developing and Unlocking the Potential of the RCE community

One of the challenges of initiating projects that are significant in scope, scale and innovative potential, is the enhanced capacity of the regional networks to initiate ongoing learning in critical sustainability areas. Unlocking local capabilities for learning and innovation would not only unleash indigenous national processes, it would also address the often pinpointed social, environmental and economic conflicts along local and international supply

chains. Capabilities here are seen as a combination of necessary values, knowledge, and skills for developing sustainable livelihood, as well as the existence of opportunities to apply them. Developing capacities, through specifically designed and implemented change projects of the RCEs in action research and transformative learning might help in unlocking the potential of the regions to address challenges of development. Most importantly, the capacity of the RCEs to be able to fulfil more ambitious governance and coordinating functions need to be developed in order to facilitate reflection, application and evaluation of the SCP and livelihood development experiences to enable meaningful learning for sustaining long term practices.

Effective and sustainable capacity building needs to cut across all segments of education and life-long learning, including curricula for formal educational system, vocational education, leadership programmes, data collection and analysis processes, research and innovation processes, community outreach and grassroots training. In order for an effective, coordinated response to emerge, a partnership with representatives of formal and non-formal education, researchers, policymakers and civil society has to emerge at the national and sub-national levels. Strengthening the capacity of RCEs to contribute to SCP and sustainable livelihood would need to be advanced by: developing platforms for exchanging information, knowledge, and practices; developing training modules for and with various groups; developing curricula for formal education, notably higher education institutions; and facilitating research for supporting knowledge and practices in the critical areas of SCP and livelihood.

The RCE community will develop not only in its capability to address sustainability challenges but also its numbers and outreach. Following the acknowledgement procedure of the United Nations University, those from Africa, Europe, the Americas and Asia-Pacific aspire to be recognised as RCEs and join the community. A more strategic approach to attracting attention of the territories of countries with pressing consumption and production system problems might assist in consolidation of the local, sub-national, partners in addressing challenges. Among the already mentioned BRIC countries, India enjoys the presence of 10 RCEs that are not only effective in finding local sustainability solutions but also in exploring coordination mechanisms among themselves and with other relevant

networks. Other rapidly transitioning countries like China, Russia, South Africa, and Brazil have a much smaller presence of RCEs, an aspect that needs focused attention. Strikingly, in most countries RCEs are located in rapidly growing cities, which have a multitude of challenges of SCP. Such RCEs, especially those that are strongly networked with local governments and other public sector organisations, could play a critical role in advancing learning and sharing both within their own network as well as with the potential entrants to the network. For example, whereas there are more than a few city networks aligning for advancing SD in urbanisation, an exclusive consortium focused on education and SCP can be envisaged through the RCE partners. Apart from addressing changes at the community level, this could play a central role in redesigning development and educational policies.

Creating Synergies with Global Networks, Processes and Policies

Fulfilling the local, national and international objectives of SCP and aspirations of developing sustainable livelihood practices requires thoughtful engagement of local and global processes. The consideration of justice and long term consequences of unsustainable practices do require assessment of local action contributions to more environmentally balanced and dignified life and effect on global policies on local quality of life. Such an ambitious task calls for engagement of the RCE community with the practices of international networks and organisations that facilitate development of policies and practices in the various aspects related to more sustainable consumption and production and livelihood practices. For example, a strong potential for collaboration might exist with National Cleaner Production Centres (NCPCs) facilitated by UNIDO and UNEP, Global Centres of UNDP, UNDP-Equator network, network of ASEAN Centres, university networks such as MESA operating in Africa, ProSPER.Net in Asia-Pacific or Copernicus Alliance in Europe. To achieve the full potential of such partnerships in realising broad goals of mobilising and building expertise in delivering SCP and livelihood actions, there is a need to conduct a broad assessment of the expertise available in the respective networks, including by the whole RCE community, and expertise required in various countries. Such mapping would identify opportunities for South-South, North-South and triangular collaborations among RCE partners and partners of other networks. With collaborative projects in place, it would be important for collaborating networks and

partners to develop channels to continuously respond to the existing gaps in expertise by identifying, developing, and disseminating analytical tools, policies and best practices to support SCP institutions and projects, while continuing to learn from these activities.

Altogether, these make the RCE community a unique partner in developing and testing distributed sustainability governance. Having already established relations or having assistance and mediation in establishing them from UNU or other RCEs, different partners might gain leverage in building a stronger community of practice in their own communities. Municipality members of the RCEs could get together in addressing pressing problems of waste minimisation while soliciting input, and developing longer term relations, with UNIDO and UNEP. Universities might be able to jointly analyse the co-engaged practices across their RCE regions while participating in various research and development fora. Organisations concerned with critical integration of various types of knowledge could collectively form research and action platforms with participation of the networks of Equator Prize winners. Whatever the subject of the international engagement, the RCE partners have an opportunity to test the knowledge and practices of the international consortia in the local context while inviting multiple perspectives of other RCE partners. Broader considerations could enable a more cohesive approach to complex systemic issues such as SCP and livelihood quality and, in turn, secure important feedback to global initiatives and processes.

Creation of synergies with like-minded initiatives would need to be complemented with policy engagement relevant to SCP and sustainable livelihood. Established at Rio+20, the 10-Year Framework of Programmes on SCP is an example of the global policy processes that give an opportunity to align the actions of many partners. By paying special attention to the importance of locally relevant and culturally appropriate approaches for learning for SCP, communities similar to the RCEs and global networks working with them could enable innovations for capacity development towards sustainable development. It will also promote selection of policy instruments for successful implementation of SCP processes and translation of SCP relevant policies into agendas of governments, businesses and civil society organisations.

Towards Distributed Sustainability Governance

RCEs and similar initiatives can be considered as seeds of the new distributed sustainability governance, where the local and the global interplay in a complex matrix of challenges. The core principles of ESD learning based on a systems approach, ability to deal with complexity, and long term thinking have to be reinforced as the complexities we face are contextual. Such learning is also important in order to shed the dominance of certain universal discourses and enable a multiplicity of models and voices.

The DESD has facilitated a strategy – nascent yet profound – towards local/global networking in ESD. To empower these initiatives and get them moving beyond pilot models, serious efforts focused on knowledge coordination and new financing mechanisms are required, along with learning for innovative, self-governance systems already in place.

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List of Abbreviations

ASEAN	Association of Southeast Asian Nations	SCP	Sustainable Consumption and Production
BIBB	Bundesinstitut für Berufsbildung (Federal Institute for Vocational Training)	SD	Sustainable Development
BMBF	Bundesministeriums für Bildung und Forschung (Federal Ministry for Education and Research)	SES	Socioeconomic Status
CBD	Convention on Biological Diversity	SME	Small and Medium Size Enterprise
CBO	Community-based Organisation	TAFE	Technical and Further Education
CEE	Centre for Environment Education, India	TERI	The Energy and Resources Institute
CSR	Corporate Social Responsibility	TVET	Technical and Vocational Education and Training
DESD	Decade of Education for Sustainable Development	UN	United Nations
DUCT	Duzi uMngeni Conservation Trust	UNDP	United Nations Development Programme
ESC	Education for Sustainable Consumption	UNECE	United Nations Economic Commission for Europe
EE	Environmental Education	UNEP	United Nations Environment Programme
ESD	Education for Sustainable Development	UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
EU	European Union	UNESCO	United Nations Educational, Scientific and Cultural Organisation
HEI	Higher Education Institution	UNICEF	United Nations Children’s Fund
HEPP	Higher Education Participation Program	UNIDO	United Nations Industrial Development Organisation
HKP	Heritage Knowledge Practices	UNU	United Nations University
IAU	International Association of Universities	UNU-IAS	UNU Institute of Advanced Studies
ICCIP	International Climate Change Information Programme	VAWT	Vertical Axis Wind Turbine
LSES	Low Socioeconomic Status	WESSA	Wildlife and Environment Society of South Africa
MESA	Mainstreaming Environment and Sustainability into African Universities	WWF	World Wildlife Fund
NCPC	National Cleaner Production Centre	WWTW	Waste Water Treatment Works
NCR	National Capital Region	YUVA	Youth Unite for Voluntary Action
NGO	Non-Governmental Organisation		
NRM	Natural Resource Management		
NTFP	Non-timber Forest Product		
OECD	Organisation for Economic Co-operation and Development		
OPEDUCA	Open Educational Regional Areas		
PV	Photovoltaic		
RCE	Regional Centre of Expertise on Education for Sustainable Development		

