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Sustainable
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MULTI-STAKEHOLDER APPROACHES

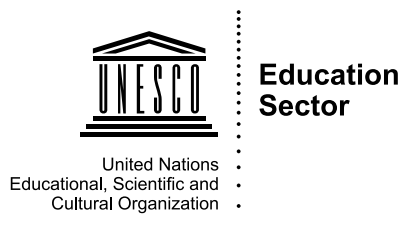
TO EDUCATION FOR SUSTAINABLE DEVELOPMENT

IN LOCAL COMMUNITIES

Towards Achieving the Sustainable Development Goals in Asia

UNESCO Education Sector

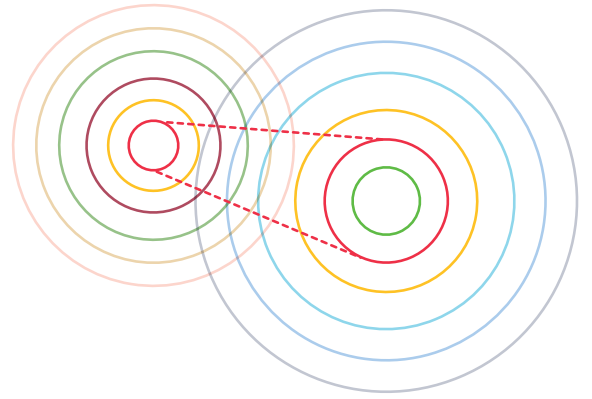
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The Global Education 2030 Agenda

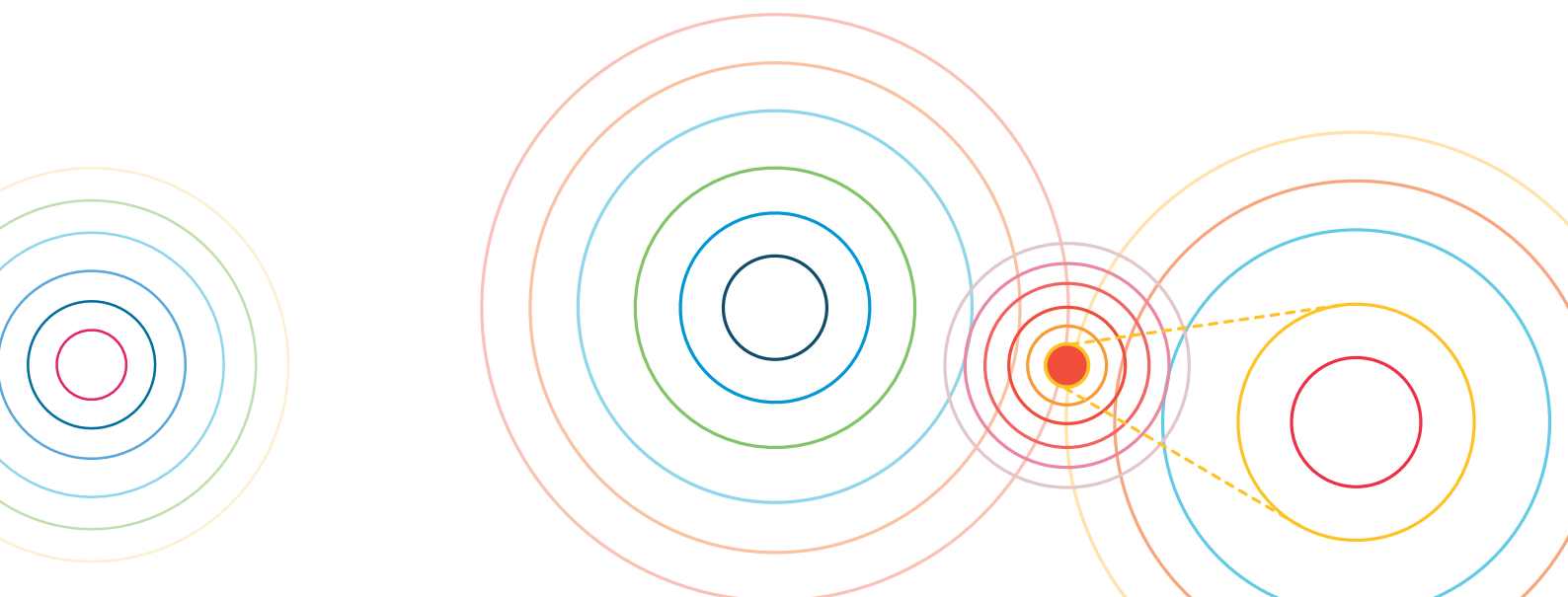
UNESCO, as the United Nations' specialized agency for education, is entrusted to lead and coordinate the Education 2030 Agenda, which is part of a global movement to eradicate poverty through 17 Sustainable Development Goals by 2030. Education, essential to achieve all of these goals, has its own dedicated Goal 4, which aims to *"ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."* The Education 2030 Framework for Action provides guidance for the implementation of this ambitious goal and commitments.





MULTI-STAKEHOLDER APPROACHES TO EDUCATION FOR SUSTAINABLE DEVELOPMENT IN LOCAL COMMUNITIES

Towards Achieving the Sustainable Development Goals in Asia



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Acronyms

| | |
|-----------------------|---|
| APEID | UNESCO Asia-Pacific Programme of Educational Innovation for Development |
| BaU | Business-as-usual |
| BEO | Block Education Officer |
| BTW | Bridge to the World Programme |
| CBD | Convention on Biological Diversity |
| CDP | Comprehensive Development Plan |
| CEE (India) | Centre for Environment Education |
| CEE (Malaysia) | UTM Centre for Engineering Education |
| CPBL | Cooperative Problem-Based Learning |
| CPW | Cumberland Plain Woodland |
| CSS | Cumberland Stepping Stones |
| DESD | United Nations Decade of Education for Sustainable Development |
| EM | Effective microorganism |
| ESD | Education for Sustainable Development |
| GAP | Global Action Programme on Education for Sustainable Development |
| GHG | Greenhouse gas |
| GIAHS | Globally Important Agricultural Heritage Systems |
| HDRAA | Henry Doubleday Research Association of Australia Inc. |
| HEC | Hawkesbury Earth Care Centre |
| HEG | Hawkesbury Environmental Group |
| IEC | Information, education and communication |
| IMELC | Iskandar Malaysia Ecolife Challenge |
| IRDA | Iskandar Regional Development Authority |
| JICA | Japan International Cooperation Agency |
| JPNJ | Jabatan Pendidikan Negeri Johor (State of Johor Education Department) |
| JST | Japan Science and Technology Agency |
| LCS | Low Carbon Society |
| MAFF | Ministry of Agriculture, Forestry and Fisheries |
| MoU | Memorandum of Understanding |
| NFE | Non-formal education |

| | |
|-----------------------|--|
| NGO | Non-governmental organization |
| NIAHS | Nationally Important Agricultural Heritage Systems |
| NSW EPA | New South Wales Environment Protection Authority |
| OHCHR | Office of the United Nations High Commissioner for Human Rights |
| PBL | Problem-based learning |
| PHC | Primary Health Centre |
| Project FLOW | Project Facilitating Learning on WASH |
| Project SEARCH | Project Sensitization, Education and Awareness for a Cleaner Habitat |
| RCE | Regional Centre of Expertise on Education for Sustainable Development |
| SAP | School Action Project |
| SATREPS | Science and Technology Research Partnership for Sustainable Development |
| SDG | Sustainable Development Goal |
| SEP | Sufficiency Economy Philosophy |
| STEP Programme | Sensitizing, Training and Empowering Peers Programme |
| SWOT | Strengths-Weaknesses-Opportunities-Threats analysis |
| SWC | School WASH Committee |
| TERI | The Energy and Resources Institute |
| TERI – EEA | TERI Environment Education Awareness area |
| ToT | Training of Teachers |
| UN | United Nations |
| UN DESA | United Nations Department of Economic and Social Affairs |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNU-IAS | United Nations University Institute for the Advanced Study of Sustainability |
| UPSBDB | Uttar Pradesh State's Biodiversity Board |
| UTM | Universiti Teknologi Malaysia |
| WASH | Water, Sanitation and Hygiene |
| WHO | World Health Organization |
| WSU | Western Sydney University |

Foreword

Local communities are the driving force of a sustainable society. This is particularly pertinent in our continued efforts to achieve sustainability as detailed in the set of aspirations known as the Sustainable Development Goals (SDGs) under the 2030 Agenda for Sustainable Development, which was adopted by the UN General Assembly in 2015. In this common mission, community engagement and action are critical to ensuring a sustainable world for everyone living in it – including both present and future generations.

The swift spread of the COVID-19 pandemic has led to a global economic and social crisis that critically affects our progress towards the global goals. Not only has it caused the tragic loss of lives and threatened livelihoods, the outbreak has also triggered educational disruption, discrimination and xenophobia, and the further marginalization of vulnerable and disadvantaged communities. As the pandemic binds us to withstand the crisis, ongoing global solidarity and shared responsibility are qualities that are more important than ever as we continue to mitigate the immediate and long-term impacts of COVID-19.

The year 2020 marks the launch of UNESCO's international framework entitled 'Education for Sustainable Development: Towards achieving the SDGs (ESD for 2030)', which aims to promote Education for Sustainable Development (ESD) with an emphasis on its role as a core part of SDG 4 on education and a key enabler of all the other SDGs. The framework also indicates the need for more inter-linkages between partners and emphasizes the community as a platform for learning and transformative action.

The collection of examples found in the publication *Multi-stakeholder approaches to Education for Sustainable Development in Local Communities: Towards Achieving the SDGs in Asia* embodies this notion of partnership and education for all, demonstrating how people from different walks of life or professional sectors can come together to learn and act in the pursuit of sustainable futures.

UNESCO Bangkok has enjoyed a fruitful longstanding partnership with the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS). Our collaboration has and will continue to support initiatives, such as this publication, that promote education and learning for all people in society in order to achieve the SDGs.

It is clear that our world will continue to face immense challenges, whether from global pandemics or the ongoing effects of climate change, poverty and inequality. These adversities have shown how humanity must persevere by working together to create a more peaceful and resilient world. I hope that readers may be inspired to embrace the collaborative spirit upheld in this publication.



Shigeru Aoyagi
Director
UNESCO Bangkok



Preface

It is my great pleasure to introduce this joint publication of UNESCO Bangkok and UNU-IAS, showcasing unique and valuable ways in which education can advance progress on the SDGs. I was first engaged in educational development at UNESCO in 1991 on the Education for All (EFA) initiative and in the three decades since, the Asia-Pacific region has made remarkable progress.

This includes reduced poverty rates, improved access to formal schooling, especially for girls, and better access to healthcare, leading to longer lives throughout the region. The Asia-Pacific region has continued to make great strides in these traditional spheres of development – health, wealth and education. While human development, as measured by the Human Development Indicators, has steadily increased in the region, these patterns of global development have come with unintended consequences.

We live in a world that is rapidly changing. Climate change, biodiversity loss and desertification now threaten human development as the natural resources and ecosystems on which we depend are reaching critical thresholds. Demographic shifts, migration and technology are changing our social systems across the planet as it now hosts over seven billion people, with the fastest growing segment of those over the age of sixty-five – a trend that is particularly pronounced in Asia and the Pacific.

While the global economy is now larger and more interconnected than ever before, inequality is rapidly rising in many developed and middle-income countries. If we are to continue the development and progress made over the past seventy years, we must learn to develop sustainably.

ESD is a key enabler for the global effort to achieve the seventeen SDGs. UNU-IAS, with its important role developing the ESD agenda through policy-oriented research and capacity building, has been advancing sustainable solutions through our global network of Regional Centres of Expertise (RCEs) on ESD for over fifteen years. This mechanism offers a holistic approach to sustainable development that reaches a wider audience on a number of critical topics. In promoting local solutions, each of the 175 RCEs across sixty-two countries has unique and innovative approaches to engage multi-stakeholders to tackle sustainable development challenges with local solutions.

It promotes learning with actions beyond schools, involving local academia and experts, local enterprises, local NGOs and government institutions. We have a large number of concrete results on how such RCEs actually created solutions. Examples include disaster risk reduction mechanisms, integrated biodiversity resources for local development, promoted socio-ecological landscapes and seascapes planning. They demonstrate a wide range of modalities for engaging with learners. This is exactly in line with UNESCO's new framework on ESD – strengthening the local mechanism in implementing all priority action areas.

These examples illustrate how people and communities can play a vital role in advancing sustainable development at the local level through multi-stakeholder partnerships. It is our hope that this book can serve as a trigger point for you and your community to lead localized education activities to promote sustainable development. Achieving the SDGs by 2030 will only be possible if each of us is willing to learn and innovate together, building communities dedicated to realizing a better, more sustainable world for all.



Shinobu Yamaguchi
Director
UNU-IAS



Acknowledgements

The idea for this publication first emerged from the '10th Asia-Pacific RCE Regional Meeting and Symposium on the Sustainable Development Goals: From Goals to Action', held from 2 to 4 November 2017 at the India Habitat Centre in New Delhi, India. The case studies presented at the symposium became the basis for this publication. We thank all those who presented their case studies on this occasion, as well as the RCE Delhi stakeholders led by the Energy and Resources Institute (TERI), which hosted the event.

Without the patient engagement and collaboration of the Regional Centres of Expertise (RCEs) that contributed manuscripts, this publication would not have been possible. We would like to express our sincere gratitude to all those who persisted through the lengthy process, even though some of the manuscripts were not eventually included in this publication: RCE Cha-am, RCE Chubu, RCE Delhi, RCE Greater Dhaka, RCE Greater Phnom Penh, RCE Greater Western Sydney, RCE-Hyogo-Kobe, RCE Iskandar, RCE Jammu, RCE Lucknow, RCE Penang and RCE Tongyeong.

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Introduction

Philip Vaughter and Mario Tabucanon

United Nations University – Institute for the Advanced Study of Sustainability

The peoples of Asia and the Pacific have a history of practice that goes back to the first human inhabitants of the region. From the earliest days of settlement in the Murray River valley of Australia to the advent of agriculture in the Indus River Valley of India and the Yangtze River Valley of China, the peoples of the Asia-Pacific region have had to live in balance with their environment. In order to do this, knowledge and practices for living sustainably have been passed down within communities from one generation to another and shared between communities through trade and exchange. The legacy of this learning can still be witnessed today in the Japanese practice of *satoyama*, the sustainable management of landscapes to support both agriculture and wildlife (Fukamachi, 2017), or traditional forms of water management making a resurgence in India and Iran (Manuel et al., 2018). At the heart of this legacy lies community engagement, where multi-stakeholder involvement with education and learning enables the whole community to pursue sustainable lives at the local level.

With the launch of the UN Sustainable Development Goals (SDGs) in 2015, the world has been given a set of aspirations to reach for every country and community on the planet – from very highly developed to developing and from rural areas to urban spaces. Between 2015 and 2030, all of us will be challenged to improve our respective countries' and communities' standing in regard to each of these seventeen goals, that lay out a blueprint for sustainable economies, societies and environments (Figure 1 below). Multi-stakeholder involvement is at the heart of the 2030 Agenda, as represented by Goal 17 – Partnerships for the Goals. This means that all sectors of society must move beyond working in silos towards working collectively on challenges for sustainable development. While the Goals themselves are global in nature, all implementation happens at the local level. Therefore, it is at the community level where multi-stakeholder involvement is critical for transforming the SDGs from aspiration into reality.



Figure 1: United Nations Sustainable Development Goals (UN, 2019)

When local community stakeholders come together to tackle sustainable development problems utilizing education and learning approaches, they enable creative solutions in the pursuit of the SDGs at the local level. Local networks employing education and learning tools serve as innovative platforms for transformative multi-stakeholder engagement. Efforts toward achieving the SDGs depend on the ability to engage with multiple partners from diverse sectors of society. Sustainable development networks are founded on shared values and voluntary and collaborative relationships in which all participants agree to work together to achieve a common purpose. The SDGs provide this common purpose: a global sustainability framework, upon which to shape and orchestrate policies at the national level and, at the same time, take multi-stakeholder partnership actions in local communities aimed at creating and accelerating sustainable development actions. It is imperative to localize the SDGs and to prioritize goals and targets relevant to community conditions, which can be done with efficacy through actual problem-based learning processes and multi-stakeholder partnerships. Multi-stakeholder partnerships in education for the SDGs entail holistic, interdisciplinary and participatory approaches to decision-making and practices, which are essential for creating sustainable solutions at the local level.

Before the SDGs were even launched, education was being touted as the most cost-effective way to deal with sustainable development challenges that had developed during the twentieth century, from climate change to poverty reduction (Lutz et al., 2014). While the mechanisms differ, the basic concept behind this proposal is a simple one: that a more educated citizenry would recognize the error in non-sustainable developmental pathways and, with ingenuity and innovation, pivot its course towards sustainable development. However, it is often the most educated of us who consume the most, produce the most pollution, and live the most beyond the boundaries of what our planet can maintain. Therefore, it is not just more education that is needed, but a different type of education.

This type of education is called Education for Sustainable Development (ESD). As opposed to a banking model of education, where students learn about a theory or concept and memorize facts in a classroom (this would be education *about* sustainable development), ESD focuses on enabling actions that lead to a more sustainable world through envisioning solutions, questioning assumptions, looking for links between systems and being empowered to enact sustainable behaviour (Tilbury & Wortman, 2004). For ESD to be successful, it must include and go beyond formal school systems to create curriculum and learning experiences to engage learners from every walk of life, including those in the adult working world and those who have already retired.

With this critical aim in mind, UNESCO has been spearheading the global movements to advance ESD, firstly through leading the United Nations Decade of Education for Sustainable Development (DESD) between 2005 and 2014, followed by the Global Action Programme (GAP) on ESD between 2015 and 2019, then starting in 2020, *ESD for 2030*, the follow-up programme to GAP. The role of local communities in creating and implementing effective ESD programmes was one of the five priority action areas within GAP. Under *ESD for 2030*, local communities will continue to be a priority action area, highlighting the critical role they play in facilitating ‘collective action for transformation and a culture of sustainability’ (UNESCO, 2019).

Because multi-stakeholder involvement is critical for moving beyond a twentieth-century paradigm of development towards sustainable development through education, and because implementation must occur within local communities for education for sustainable development to take root, it therefore follows that local communities must take an explicitly multi-stakeholder approach to enact meaningful ESD. But what type of platform would provide multiple and diverse stakeholders a means for facilitating learning on sustainable development within a local and/or regional context?

The RCEs on ESD, coordinated by UNU-IAS at the international level, provide useful insights in considering this question. An RCE is a multi-stakeholder network of formal education institutions – schools, universities and vocational training centres – and institutions that incorporate non-formal education (NFE) into their mandates, including local government offices, environmental NGOs, local enterprises, media, zoos, botanical gardens and parks working together to facilitate learning and action through ESD in a local setting (see Figure 2 below).

The RCE model began in 2005, at the onset of the DESD. During this year, UNU-IAS acknowledged an initial set of RCEs based on consultation with the Ubuntu Committee of Peers – representatives from the educational and scientific institutions that signed the Ubuntu Declaration at the Johannesburg Summit in 2002. The four major goals of any RCE are to collaborate among partner organizations in order to:

1. Re-orient education towards sustainable development, both integrating ESD into existing course content and designing new curricular content that addresses sustainable development issues on a global scale, as well as on the local scale in which they operate.

2. Increase access to quality education for all community members in a given local or regional context.
3. Deliver teacher and trainer training programmes, including pedagogies and learning materials for them.
4. Lead advocacy and awareness-raising in the public on the importance of sustainable development and the importance of ESD in achieving this.

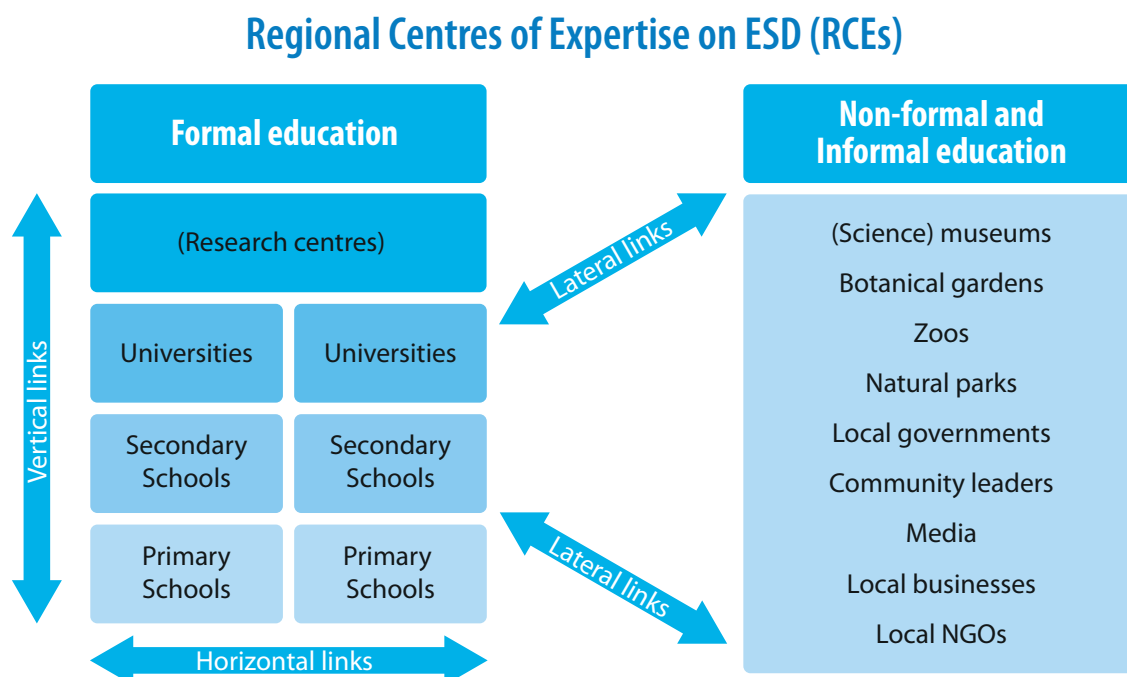


Figure 2: Conceptual model of Regional Centres of Expertise (RCE) on Education for Sustainable Development (ESD)

At the time of the publication of this report, there were over 170 RCEs globally, with nearly one-third of these within the Asia-Pacific region. The Asia-Pacific RCE community is a unique synthesis of universities, local school systems, local governments, NGOs and members of the private sector working in NFE, all working together within their respective communities on using education as a mechanism for sustainable development. As a region, the Asia-Pacific RCE Network has been meeting since 2008, with its inaugural engagement at RCE Tongyeong in the Republic of Korea. It is from these regional meetings that the ESD projects presented here are shared and elaborated upon, along with countless other good cases over the years.

The cases presented in this publication show a snapshot of the multitude of ESD projects that RCEs in the region work on. While the cases are presented here around the SDGs – notably Goal 6 (clean water and sanitation), Goal 12 (responsible production and consumption), Goal 13 (climate action) and Goal 15 (life on land) – it would be a disservice to any of these projects to view them only through this lens. Sustainable development and, therefore,

ESD is a complex and interconnected concept with many intersecting threads feeding into one another. All of these cases approach sustainable development through Goal 4 (quality education) and specifically through Target 4.7 within Goal 4 – ensuring all learners have the knowledge and skills to promote sustainable development. However, the story does not end there.

The particular emphasis within ESD of moving beyond theory to praxis presents its own unique set of opportunities and challenges to the Asia-Pacific region. For instance, many school systems in the Asia-Pacific region are considered among the world's most comprehensive, with pupils readily out-performing peers from other regions. However, virtually all of these school systems work on a banking model for education – a mode for learning that an ESD model of education would find inadequate, as these often lack the critical link from learning to doing – which makes ESD actionable. In the following situations, the content of the ESD cases will focus not only on what was learned, but also on what was done by the learners. It is not only the content of the learning that makes RCEs' work so relevant to today's sustainable development agenda, but also the mode in which they operate makes their work unique and critical.

Throughout these cases, university lecturers will leave their campuses and enter primary school classrooms, city halls and farmers' fields. High school teachers will enter into academic conferences as experts on the application of ESD in the field, and students will become the teachers as they take the lessons they have applied and provide instruction to their families and communities. RCEs work because they are able to take actors out of their limited roles in one setting, and place them as educators and capacity-builders in other settings.

The cases presented here show how RCEs create solutions that enable sustainable development practices in local communities by utilizing education, innovative learning methods and multi-stakeholder partnerships. Local stakeholders take ownership of the sustainability processes, consistently address the targeted SDGs, and demonstrate RCE contributions to the *ESD for 2030* priority action areas – policy, education and training settings, educators, youth and community.

The cases cut across the priority areas and support integrating ESD into policies in education for sustainable development by mainstreaming good practices and bringing about systemic change. RCE Hyogo-Kobe, for instance, focuses on increasing the involvement of younger generations, farmers and non-farmers in policy-making on biodiversity conservation in agricultural landscapes. Research on biodiversity in rivers and in a canal construction project serves as a stepping stone for understanding the way to involve multi-stakeholder participants in policy-making through education.

The cases also notably exemplify integrating sustainability principles in line with whole-institution approaches. The RCE Chubu initiative highlights harnessing the synergies of traditional and modern knowledge on ESD and using these to connect local and global sustainability issues within a national park. RCE Lucknow's mobile ESD exhibition is a vehicle for creating awareness on biodiversity issues across a school system. RCE Greater Western Sydney dedicates a centre to teaching and learning ESD for, by, and of multi-stakeholders in the surrounding area, providing a communal setting for ESD.

Within RCEs, educators and trainers become learning facilitators for sustainable development to a wider audience than schools or universities. RCE Cha-am conducts learning and capacity-building for the entire local community and beyond with modern research, local wisdom, and traditional knowledge utilized to educate locals and tourists on how to conserve natural resources in a watershed. The urban biodiversity initiative of RCE Greater Western Sydney is a successful engagement of the general public, including landowners, schools and the corporate community. In this case, the RCE works to address and act on urban sustainability issues impacting the community through education and for enhanced ecological connectivity and native biodiversity conservation. This showcases how local issues with a global agenda can be addressed through multi-stakeholder engagement.

Supporting youth in their role as change agents for sustainable development is also addressed by RCEs when engaging local communities. RCE Tongyeong exposes local youth to sustainability issues regionally, nationally and globally by interacting with youths from other RCEs, and organizing different types of learning activities around different themes in sustainable development. RCE Iskandar contributes towards creating a low carbon society in an economic corridor through engaging with youth in schools and then having youth become educators for their community on climate action. RCE Delhi demonstrates how education and multi-stakeholder partnerships enable action to be taken on the SDGs related to health and water sanitation, as well as natural resource conservation, by partnering across different sectors to create and disseminate curricula on water, sanitation and health to youth through schools across the country. Teachers, students and community members learned from these curriculums, and the knowledge gained is applied in schools, hence 'learning to know' and 'learning to do' are realized. In another case, RCE Delhi aims at raising awareness among school students, teachers, school communities and society at large on the issue of waste, encouraging students as well as teachers to practice the '4Rs' – refuse, reuse, reduce, and recycle – in their daily lives and make responsible consumption choices through innovative approaches to learning.

These cases all aim at accelerating local level action for sustainability. For example, RCE Cha-am demonstrates a bottom-up, participatory approach to adaptive planning and management of a watershed area development enabled by education and multi-stakeholder partnership in the surrounding communities. Data and information are gathered with the participation of community residents guided by the scientific community. RCE Hangzhou addresses sustainable development issues of a city regarding water quantity and quality through the participation of communities, schools, and civil society at various levels of the learning spectrum – learning among individuals, learning among organizations, and learning among communities, utilizing the principles of inclusiveness, innovation, transparency and accountability.

In order to share the great wealth of knowledge and skill we have accumulated as a species, it is becoming increasingly necessary to transverse institutional boundaries that have become more and more rigid since the industrial revolution. There will always be a space for specialization, but the sharing of successful pedagogy and practice in regards to ESD topics between different types of stakeholders makes education more efficient and

more participatory. There is no reason to burden teachers, who are often overworked in many formal schooling systems, with the creation of curriculum for ESD when so much content has already been developed by government ministries, NGOs and civil society groups. The work now is to connect these actors to make an ESD agenda that is both well integrated between formal and non-formal actors, as well as contextualized to local settings and participatory for all members of a community.

RCEs in the Asia-Pacific region have been undertaking this work for fifteen years now, spanning dozens of cities and communities across fifteen countries. As the region continues to grow in terms of both its economies and populations, the need for education as a tool for enabling sustainable development will continue to increase, along with the need for educators to impart this knowledge and sets of practices to the communities in which they operate. In this sense, RCEs are well positioned to serve as not only sites of education, but also foci for teacher and educator training, as can be seen in the ESD projects discussed. By enabling not just education, but also educators, the RCE model provides a resource for both formal school systems and informal education programmes that wish to update curricular content and expand their audience.

While agenda-setting for sustainable development will remain at the global level for the foreseeable future, all implementation is local. RCEs across the Asia-Pacific region serve as important entry points for the implementation of sustainable development in their cities and communities through the education and training they undertake. By using education to translate global aspirations into contextualized, local reality, RCEs in the region stand ready to do the local leg-work for global policy-makers. The cases presented in this publication are but a sample of the work being undertaken across a few of the global sustainability issues facing the region. The diversity of actors, pedagogies and modalities for engaging with learners stands as a testimony to the region's diversity. However, the commitment to the integrated UN agenda for making our world more sustainable is a humbling reminder of how similar we all are in our hopes for a brighter future. This is a world that has preserved gains brought about through past development and safeguarded future generations so they are able to enjoy the same benefits that have so richly benefited us. It is this goal – to use education as our best means for enacting sustainability, both for ourselves and the planet – that unites the RCE network, both regionally and globally.

The challenge now is not just to develop along a twentieth-century paradigm for what a good life should be, but also to develop sustainability so that human societies can survive and flourish within ecological boundaries and without discounting the needs of future generations.

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Promoting sustainable consumption choices through active citizenship and value-based learning

RCE Delhi, India

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SDGs to which the work contributes: 4 and 12

Introduction

One of the most visible and striking symbols of our disdain for the environment is the piles of refuse we see in the landfills. Our sense of ownership and responsibility for what we produce and what we consume ends the moment something becomes waste. More specifically, our piles of rubbish have grown astronomically over the last few decades because of our growing population and our increasing appetite for conspicuous consumption. Over the ages, just as developmental activities have progressed, the quantity, composition and complexity of the waste produced have also increased.

Against this background, a concerted and sincere investment in educating and empowering people is by far the best possible way to attain development that is socially, economically and ecologically sustainable. RCE Delhi realizes that only if youth are empowered with sufficient knowledge, enabling skills, and appropriate attitudes and values can a just and environmentally conscious society be created. In order to realize this belief, RCE Delhi members TERI - EEA (Environment Education Awareness) joined hands with Tetra Pak India (part of the multinational food packaging company that provides wrapping and packaging machines and food containers for processed food) to implement Project SEARCH from 2009 to 2016.

SEARCH stands for Sensitization, Education and Awareness for a Cleaner Habitat. It was a school ESD programme that aimed to raise awareness among school students, teachers,

school communities and society at large on the issue of 'waste'. The idea was to encourage young students, as well as teachers, to practice the '4Rs' – refuse, reuse, reduce and recycle – in their daily lives and make consumption choices that would trigger redressal of SDG 12 on responsible consumption and production. Through this programme, a sincere attempt was made to instil a sense of responsibility in the target group to differentiate between 'needs' and 'wants', to take ownership of the waste generated by them, and to make efforts to increase a product's life cycle by recycling it.

Our approach

All member schools within the project were co-educational, educating approximately equal numbers of boys and girls across all grade levels in the respective school. Project SEARCH enabled students, teachers and other community members to develop the following knowledge base, skills and attitudes:

Knowledge

- An understanding of the plant, animal, human and the material world and their interlinkages with an individual
- Waste and its various types and constituents
- Waste management, including segregation, dumping, landfills, incineration
- Environmental, health and social problems caused by waste
- Life cycle analysis of products
- An understanding of the linkages between aspirations, consumerism and waste generation
- Carbon footprints
- The concept of the '4Rs' – refuse, reduce, reuse and recycle
- The interconnectedness between social, political, cultural and environmental issues

Skills

- The ability to be a multiplier and educate others about the relationship between human beings and the environment
- The ability to impart knowledge on waste management and specifically about the recycling of post-consumer Tetra Pak cartons
- The ability to make products using eco-friendly materials and processes like papier-mâché, pottery, greeting cards and jewellery using eco-friendly material and paper bags
- Proficiency in conducting a life cycle analysis of products
- The ability to lead community activities and the understanding of running a social entrepreneurial set-up within a school

Attitudes

- Appreciate, evaluate and understand the relationship one has with nature and its various constituent systems
- Value the interdependence that exists between all living organisms on the planet
- Understand the consequences of adopting a materialistic life that leads to environmental degradation
- Assume responsibility as consumers and take actions that are not driven by individual interests but contextualized within the greater social good
- Recognize the finiteness of resources
- Be able to comprehend one's need and separate it from desires
- Respect others and their perspectives
- Take initiatives to resolve issues rather than wait for someone else to take the lead

The above concepts were embedded in the project methodology, which is described as follows:

1. Classroom workshops

Sensitization workshops on waste and sustainable development were conducted for students, teachers, parents and school administrators. RCE Delhi also organized film screenings as part of workshops along with exposure trips to places of environmental, social and cultural significance. The awareness and sensitization were done using non-formal teaching methods which involved interactive discussions, simulation exercises, games and group activities. The workshops were designed around a module that comprised three overarching themes:

- Understanding the environment with a special focus on waste management:** Under this theme, a session on interconnection between the 'environment' and the 'individual' was highlighted, coupled with a group activity of how lifestyles have changed from the Stone Age era to the modern age, which has led to environment degradation. There was a film screening of *A Second Hand Life*, a Public Service Broadcasting Trust production, followed by a discussion.
- Culture of waste – lifestyle and consumerism:** A session on consumerism and the green economy was undertaken followed by an individual activity on assessing the lifecycle of an individual piece of waste. A film screening and discussion of *The Story of Stuff*, an animated film which describes the life cycle of material goods, directed by Annie Leonard, an executive director of Greenpeace USA, was also part of the workshop.
- Environmental leadership - Living the '4Rs' (refuse, reuse, reduce, and recycle):** This module was a hands-on activity for students that built upon the competency of students involving the 'learning to do' principle, helping students to upcycle waste

generated in a school compound. Different art products were created such as paper jewellery, recycled paper, papier-mâché, baskets and bags out of single use plastic and other waste materials.

Each of the above modules was complemented by a session conducted by Tetra Pak to discuss the modalities of collection of waste from the school premises.

2. Leadership development programmes

Enabling students and teachers to realize their true potential and empowering them to make a difference to other people's lives was another important aspect of Project SEARCH. There were four such activities that were held every year as part of the project:

- a. **STEP (Sensitizing, Training and Empowering Peers) Programme:** This unique leadership development programme for students is aimed at providing a journey of self-exploration, understanding one's true potential and preparing individuals to act for solutions in the school neighbourhood. Through the STEP programme, students were given an opportunity to implement their project ideas. A few examples of students' projects include a capacity-building programme designed for the school community on discouraging the use of aluminium foil and banning it from campus; a door-to-door campaign for collecting Tetra Pak cartons; and the publishing of an e-newsletter on waste. In the seven years of the project's implementation, Project SEARCH witnessed approximately 180 projects led by students in their communities.
- b. **Tetra Pak Ambassadors Programme:** As the title suggests, the main objectives of this programme was to select and identify ten ambassadors from each city to become torch bearers for the scheme. These ambassadors underwent an intensive training and exposure on waste handling and management and became master trainers in their own schools. The SEARCH Project trained approximately 100 such students in this capacity.
- c. **School Transition Campaigns Programme:** A teacher-driven intervention, these campaigns were owned and managed by teachers and a select group of students. The campaigns were implemented based on the interest and background of teachers and focused on any environmental issue they chose. A couple of examples include St Mary's School in Delhi, which undertook building a sound-proof music room using Tetra Pak cartons, and the Army Public School in Bengaluru, which initiated a project on drip irrigation to 'green' the school campus.
- d. **International Antarctic Expedition – Leadership on the Edge Programme:** In 2012, one of the project coordinators participated in an Antarctic expedition with the objective of placing the message of Project SEARCH within a global learning context. Another year, Ms Seema Sharma, a teacher at Vidya Valley School in Pune, joined the expedition through a contest that ran among teachers within all of the locations.

3. Beyond books and walls

Competitions, nature trails, outdoor camping, learning-by-doing activities and field visits were some of the other features of Project SEARCH used in education on waste. Field visits to landfills, polluted lakes and beaches, virgin forests, junk dealers' neighbourhoods and old/historical parts of cities gave the students an opportunity to experience the issues firsthand. Hands-on activities such as paper recycling, pottery, papier-mâché and 'wealth out of waste' fired students' imaginations and catered to their creative side. As part of the project, the students in each of the member schools collected empty Tetra Pak cartons and other dry recyclables on a daily basis and threw these into special bins provided for them. The waste was then gathered by a local collection agency and sent to recycling mills, and after sorting, it was converted into useful products. This project aimed at making schools 'garbage free zones.'

Outcomes

Innovation was at the core of Project SEARCH. The philosophy of the project was not merely to generate new ideas, but to set in motion changes through these ideas. Some of the most valuable concepts were:

1. STEP (Sensitizing, Training and Empowering Peers)

STEP was a leadership development programme based on value education in ESD for school students and teachers. It was one of the key programmes of Project SEARCH that aimed to train and enable young students to become leaders and active participants in a sustainable development movement and to not remain passive observers to a critical process. The project had its foundation in UNESCO's understanding of ESD, which is based on 'all levels and types of learning to know, learning to be, learning to live together, learning to do and learning to transform oneself and society'.

2. TRASH Festival (Thinking, Reflecting and Acting for a Cleaner Habitat)

This was a three-day festival that was a celebration of 'all things positive in our lives' including positive thoughts, actions, sustainable practices, people, values, dreams and traditions. The festival promoted and demonstrated the concept of 'sustainable lifestyles', and encompassed activities that were directly linked with upcycling and waste reduction such as papier-mâché, paper jewellery making, sewing workshops for both boys and girls, repairing workshops and a sustainable fashion show. The *Repair* workshops during the festival focused on teaching girls how to repair electronic devices and teaching boys how to sew, thereby encouraging students to move beyond stereotypes for maintenance activities.

3. How full is your bin?

Each member school received two bins made from recycled Tetra Pak cartons – one for the collection of Tetra Pak cartons and the other for dry recyclables. The schools in each city were connected to a local collection partner. Once the bins were full, the coordinating teacher called the collection partner who collected the refuse from

the school. During such a visit, the collection representative weighed the total waste deposited by school and gave a receipt to the school for recordkeeping.

4. Radio jingles and use of popular media

In April 2012, five schools participated in a jingle-making activity in which each school was given the lyrics of the jingle. The schools had to compose their own jingle and choose their own instruments and melody. These jingles were later recorded by Radio Mirchi at 98.3 FM and aired on International Earth Day 2012.

5. *Kabaad Se Jugaad*

Literally translated, *Kabaad Se Jugaad* means 'something useful out of waste'. This activity was held every year and it involved students creating products from waste. This was a very effective way to bring about a change in the 'use and throw' attitude prevalent in society. Products that stole the show at this time were lamp shades, laundry bags, paper baskets and coasters, all made from newspaper or Tetra Pak cartons.

6. Tale of My City

In 2011, a painting competition was organized in Delhi, Mumbai, Chandigarh and Bangalore on the theme 'Tale of My City'. The students painted on recycled paper their respective city as they saw it, as they connected with it and as they comprehended it. This initiative brought out the place each student perceived for him- or herself within the city space. From Delhi's Gazipur landfill, the 2008 terror attacks in Mumbai, traffic congestion in Bangalore, to planned roads in Chandigarh, the paintings represented the myriad of emotions and understanding the respective city triggered in these young minds.

Through these innovative interventions the project produced many achievements, such as:

- Awarded the 2012 Wenhui Award for Educational Innovation by the UNESCO Asia-Pacific Programme of Educational Innovation for Development (APEID) and the National Commission of China for UNESCO;
- Received the RCE Recognition Award in 2012 for its contribution to multiple methodological approaches to applying ESD in schools which can be upscaled;
- Total waste collected since the inception of the project in 2009 was over 25 tons. This waste was sent to recycling mills and converted into notebooks, CD covers, bookmarks and roofing sheets.
- The project reached out to over 500,000 students, teachers and community members;
- Three films were developed – two documenting the project and one a full-length documentary film titled *Half a View*, a TERI production directed by filmmaker Ankit Pogula;
- Two publications were developed; one was a student-friendly guidebook cum workbook on waste and the second was *World of Possibilities*, a compilation of successful case studies of students and teachers;

- The first ESD programme in India to participate in the International Expedition Programme, 'Leadership on the Edge';
- One of the few ESD programmes in India to have a leadership development programme exclusively for students.

While girls and boys made up approximately equal numbers of the participating pupils in the involved schools, the majority of the teachers that were trained and worked with the RCE in planning and implementing the project were women (around 90 per cent).

Final reflections

Project SEARCH was implemented for seven years and throughout the project cycle, there were immense challenges – the solutions to which were often found through working with partners on the ground.

SEARCH was a multi-stakeholder programme, spread over six locations in India. For the period of 2011 to 2012, the project was also piloted in Dhaka, Bangladesh. It sometimes became difficult to accommodate every stakeholder's needs and requirements. To address this problem, a stakeholders' meeting was organized to hear different perspectives. This provided a valuable occasion to acknowledge the efforts made by collection partners in working towards one of the key objectives of SEARCH, which was to turn schools into zero refuse zones.

Secondly, since SEARCH had its roots in value education, it was challenging to assess its qualitative and quantitative impacts. Assessment questionnaires were developed to meet this challenge and were administered after each session. The students were encouraged to write for school magazines, conduct assembly sessions, and create blogs and Facebook pages in order to ensure the sustained involvement of students in SEARCH.

Lastly, recycling is not seen as something critically important in India. Motivating parents to recycle at home was and continues to be a big challenge. Most people look for incentives and in the absence of these, they were not very keen on participating in such activities, even when children were keen to do so. SEARCH also collaborated with schools to put up SEARCH stalls during parent-teachers' meetings. Instead of facilitators from TERI, the students spoke to parents about recycling and other environmental issues.

Project facilitators would meet the member schools in all of the seven project locations at least once a month. This went a long way in building the capacity of the schools to carry forward the programme, even when RCE Delhi exited. The creation of a cadre of teachers and students leaders who were skilled and able to conduct the programme in their respective schools was one step towards the sustainability of the programme itself.

Efforts on linking schools with collection partners and over the years developing individual understanding and relationships with these agencies was key in contributing to waste collection, even after the project was completed.

Project SEARCH was a 'people oriented' programme and it managed to bring about impressive attitudinal and behavioural shifts in the target group, with close to 70 per cent of schools still undertaking the collection drives and contributing towards 'zero' waste zones within their schools.

Lessons learned from SEARCH will leave a deep impression and point the way forward for the 200 schools that joined the initiative. However, more still needs to be done when it comes to controlling lifestyles and reducing waste at sources outside of the school setting.

While the Indian government is taking every step to improve the waste management scenario of the country, little has been achieved when it comes to source reduction in domestic households. There have been no sudden policies for sustainable lifestyles and reduced waste generation. Governments should therefore invest in exercising more stringent policies at the production level, so that buying becomes eco-friendly and sustainable.

Moreover, more investment should be undertaken on educating the masses. Education helps change behaviour by making citizens more engaged. People with more education tend not only to be more concerned about the environment, but they are also more inclined to engage in activism that promotes and supports political decisions that protect the environment. Such pressure is a vital way of pushing governments towards the type of binding agreement that is needed to safeguard the world's ecosystems.



Driving the twin objective of facilitating learning on Water, Sanitation and Hygiene (WASH) and providing access to water through ESD approaches

RCE Delhi, India

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SDGs to which the work contributes: 4 and 6

Introduction

Access to water and sanitation facilities is a matter of global concern because their usage is directly related to socio-economic development. Poor water quality and lack of sanitation facilities have many implications, including the degradation of ecosystem services, human health-related costs, and impacts on economic activities such as agriculture, industrial production and tourism. Furthermore, poor water quality brings with it the increased burden of water treatment costs and reduced property values.

India is one of the most water-challenged countries in the world. Groundwater levels are falling as wells and aquifers are drained by agricultural, commercial and industrial sectors. Gross disparity in access to clean water exists throughout the country, even after significant progress has been made in the supply of safe water over past several decades. The World Bank estimates that 21 per cent of communicable diseases in India are related to unsafe water. Diarrhoea alone causes over 1,600 deaths daily. Hygiene practices also continue to be a problem in India. The practice of hand washing is not common, increasing the spread of disease.

The World Health Organization (WHO) has estimated the economic costs avoided and returns gained by various levels of investment in water supply and sanitation services; for every US\$1 invested in improved water supply and sanitation yields, there is a gain of US\$4 to US\$12, depending on the type of intervention.

Since 2015, the SDGs have committed the international community to expand international cooperation and capacity-building on water, sanitation and hygiene (WASH)-related activities and programmes and to support local communities in improving water and sanitation management through SDG 6 on clean water and sanitation.

Against this background, RCE Delhi implemented the Project Facilitating Learning on WASH (FLOW) with the aim to convert awareness and knowledge into action by educating schools and communities on WASH issues. The project facilitated access to safe water solutions to targeted schools through the installation of WASH infrastructure, thus paving the way for UNESCO's principles of 'education of learning to know and learning to do'.

Our approach

The project's methodology was designed in a way to touch the lives of different stakeholders who had significant roles in the sixty identified schools across the targeted locations. The scope of work was divided into three broad categories (detailed below) and was spread across the project's three-year cycle. Since the main focus of the project was WASH education, a deliberate effort was made to be inclusive towards women and girls in the programme, so that issues affecting their health and hygiene could be discussed. The education project's implementation team from RCE Delhi were all women, because of the sensitive nature about reaching out to women and girls about this topic in the region of implementation.

Needs assessment

A needs assessment identified peri-urban cities in six Indian states and secondary schools within these states. Focus group discussions with students and in-depth interviews with teachers within these schools were used to understand the gaps in their knowledge on WASH practices. Community resource mapping and problem prioritization activities were also conducted to understand the respective school's neighbourhoods and the availability of fresh water sources. The needs assessment study helped in attaining the following outcomes:

- Six peri-urban locations were identified from north, central and eastern regions within the country. These locations were determined, keeping in mind the vulnerability quotient in the WASH domain, cooperation received from the education department of respective state governments, and the prevalence of Bharti Infratel offices (a leading telecom tower infrastructures provider company in India) in the respective states for day-to-day coordination and monitoring.
- Ten secondary schools were identified in each of the six cities. These schools were determined based on needs within the schools, a lack of minimal WASH infrastructure (such as drinking water stations, water purification systems and rainwater harvesting equipment), and limited or no instruction in the curriculum on water, sanitation and sustainable development issues.
- The gap between knowledge and applicability in regard to WASH activities was massive. Students had very limited knowledge about the significance of clean water and hygiene regarding their own wellbeing or towards development. Teachers also had

difficulty completing the course and were found to have hardly focused on the subject. Teachers, along with the students, needed serious sensitization to capacity-building around safe water, sanitation and hygiene across all the cities.

- Estimation was made on the availability and feasibility of procuring safe water from available resources, along with ascertaining infrastructural interventions, in order to ensure access to safe drinking water in the project schools.

Education and awareness

The project adopted a multi-stakeholder approach in targeting a diverse set of learners. The beneficiaries were school students, teachers and other members of the respective communities. Hence, a separate set of training and capacity-building programmes were organized for these groups. These activities were interspersed within the school calendar for the entire project's duration.

- **Students:** Two series of WASH curriculums were developed, involving a combination of both classroom interactions and field experience. This ran on a module-based approach, which was divided into five levels of interactions. With each passing module, the level of training imparted was intensified. A total of five training events were organized for students in each city. These trainings covered a variety of WASH issues, which are listed in Table 1. An example of the content supplied on five of the student workshops. In total, the project has implemented 368 workshops, reaching out to approximately 112,000 students.

Table 1: An example of the content supplied on five of the student workshops

| | |
|----------------------|---|
| Knowledge Workshop 1 | <ul style="list-style-type: none"> • Introduction to Project FLOW • Sharing results of needs assessment • Introduction of WASH theme • WASH understood as a human right • Film screening: <i>Whistles in the Field</i>, a TERI production on curbing open defecation |
| Knowledge Workshop 2 | <ul style="list-style-type: none"> • Recap of previous workshop • Distribution of TERI's portable water testing kit to all member schools • Training of students in checking the water quality through physical, chemical, and biological parameters |
| Knowledge Workshop 3 | <ul style="list-style-type: none"> • Recap of previous workshops • Screening of a film titled <i>Drop by Drop</i>, a TERI production on water conservation • Traditional means of water conservation in medieval history |
| Knowledge Workshop 4 | <ul style="list-style-type: none"> • Recap of previous workshops • Hands-on activity: Water audit • Introduction to wastewater • Film screening: <i>Stinking backyard</i>, a TERI production on curbing waste water |
| Knowledge Workshop 5 | <ul style="list-style-type: none"> • Revisiting the topics from knowledge workshops 1–4 • Group activity: How to maintain safe water infrastructure in your respective schools • Achievements of the city as part of the project • WASH quiz |

- **Teachers:** A Training of Teachers (ToT) was organized that incorporated an array of teaching strategies such as film screenings, hands-on activities, group work and panel discussions. The project undertook sixteen such training activities and reached out to approximately 600 teachers. The broad topics discussed were as follows:

- Keynote address on 'WASH in Schools – Realities and Challenges'
- Panel discussion: WASH and its interpretation in education, policy and society
- Film screening: *Whistles in the Field*, a TERI production on curbing open defecation
- Thematic discussion: How to use the WASH curriculum?
- Group work: 'How clean is my bin?' An activity to understand the kind of waste we generate and the checks and balances that can be implemented to minimize waste generation

In order to inculcate values of school leadership, teachers with the help of students implemented a School Action Project (SAP) within their respective schools. The idea was to internalize WASH conscious practices in schools and trigger behavioural change among the students. Activities included in – but not limited to – SAP were as follows:

- Formation of School WASH clubs
 - Organization of a street play for spreading awareness in the school neighbourhood
 - Discussion forums for parents on household hygiene
 - Pamphlet distribution for menstrual hygiene
- **Communities:** Informal interactions in the form of street plays, cleanliness drives and door-to-door awareness drives were undertaken to reach out to community members. Fifty-eight workshops for parents of school students were also organized to sensitize them to WASH-centric behaviours. The topics ranged from household hygiene, government schemes on WASH, waterborne diseases and ways to curb them, and do-it-yourself activities for purifying water.

A number of supplemental workshop modules on menstrual health were also provided to school girls and their mothers during a community workshop. This workshop addressed menstrual hygiene, myths associated with it and linkages to reproductive health. This workshop was designed to discourage absenteeism among girls from school activities during their menstrual cycle, reduce vulnerabilities and increase health and self-esteem.

- **School WASH Committee (SWC):** In order to sustain the infrastructural measures and their regular usage, an SWC was formed in each school. Each committee was comprised of a school principal, local councillor, Block Education Officer (BEO), a doctor from a Primary Health Centre (PHC) or government hospital, two active teachers, four active parents, four school office bearers, and one school administration staff. A workshop was undertaken for the members to inform them about the project's interventions,

corrective measures that were to be adopted, and opportunities that were to be utilized upon the project's completion. Capacity-building of SWC members was a crucial final step before exiting from the field.

Installation of WASH infrastructure

Schoolwide and need-based interventions were recommended and implemented, keeping in mind the project objectives covering the aspect of water conservation, along with provision of drinking water solutions converging with the ideologies of SDG 6. This was based on needs assessment, a feasibility study, field observations, water quality data and secondary data assessment, and experience from other similar projects. Some of the identified interventions implemented in all the sixty schools are categorized below:

- **Drinking water and water for sanitation provision:** This includes provision of drinking water through the construction of a platform with taps as per the guidelines of the Central Public Works Department of the Government of India, along with storage tanks. Another intervention was water quality improvement through treatment by reverse osmosis, as per the guidelines for water quality in each region. A further initiative was to improve access to water supply and storage systems through the placement of the pipeline framework within the school and with the requisite number of tanks.
- **Water conservation:** This includes construction of a rooftop rainwater harvesting structure wherever applicable.
- **Learning resources:** A knowledge hub on water-related issues was established in all of the project schools, comprised of material on WASH such as project posters, WASH curriculum and information banners.

Outcomes

This project introduced best practices to some very innovative schools, who were not only custodians of change in the WASH curriculum, but they also continued to take serious measures towards teaching WASH even when RCE Delhi exited the project in October 2018. One prime example is the Government Boys Middle School No. 40 in Indore, Madhya Pradesh, India, one of the oldest schools in the region. Since 1956, nothing had changed regarding education or facilities on water and sanitation. However, school principal Mr Ashok Thandele reversed the inactivity on this issue when RCE Delhi approached the school about a WASH curriculum. Mr Thandele canvassed support from local councillors to build new toilets to supplement the project. Similarly, Pilingkata High School in Pilingkata, Guwahati, Assam, undertook security of the WASH infrastructure seriously and contributed to ensuring the water supply by fixing iron gauges around the water platform to discourage spoilage and theft.

Of the sixty member schools that participated in the project, a total of 56 per cent of the student population were girls. TERI has compiled success stories of more than twenty schools in a publication titled *Pravah... Go with the FLOW* in its *Go with the FLOW* series. The book gives instructions to all educational institutions who wish to assume the responsibility for dealing intensively with issues related to WASH and sustainable development, and to encourage the development of essential competencies for internalizing WASH in thoughts, practice and action.

The project undertook a post-project assessment during its last year of implementation to gauge the effectiveness of the project and evaluate the results vis-à-vis the overall objectives of the project. This exercise also helped in developing a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis of the project and remedial actions for the ways forward. The post-project assessment gave answers to the following:

- **Overall efficacy of the programme:** Most of the respondents felt that the project was successful when it came to involving all the stakeholders in the school and the surrounding community. There was something for everyone to learn about and take action on. The recall value for the programme and its themes were high considering that the entire school and the local community were incorporated into the learning process.
- **Evaluation of the education methodologies of Project FLOW:** Most of the respondents felt that the education methodologies adopted, especially during the workshops, were engaging and left students with enough food for thought. Programmes like *Jal Tarang*, a one-day festival that celebrated the values imbibed by the project, were well received.
- **Efficacy of the WASH infrastructure:** Schools have been extremely helpful in placement of infrastructure. Teachers have suggested that, although there was a delay in finishing the job assigned, it has catered to the direct needs of students.
- **Future discourse:** According to respondents, most said that a school ESD programme should concentrate on activities in schools. Involving communities in a school programme diverts time and resources – which teachers often provide – away from schools. Moreover, it was a challenge for schools to engage parents in community education.

Table 2: Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis of the project

| Strengths | Weaknesses | Opportunities | Threats |
|---|---|---|---|
| <ul style="list-style-type: none"> Peer reviewed content and distinct pedagogy. Robust project review and course correction by TERI. Partnership at the state government level in four out of six locations. | <ul style="list-style-type: none"> Non-cooperation from education department in two cities. Stringent school calendar. Low community participation in a few schools. | <ul style="list-style-type: none"> Scope to increase the outreach to more schools and communities. Strategy to design a comprehensive leadership plan for teachers on topics. Showcasing the results at TERI's existing flagship programmes such as the World Sustainable Development Summit (WSDS). | <ul style="list-style-type: none"> School-based conditions such as lack of security to prevent theft, cleaning staff, etc. Project activities not getting internalised in the government school system. |

- **Outreach:** The project has reached out to the entire school strength in all six peri-urban towns along with teachers, parents and community members. Details of which are identified in the table below:

Table 3: Number of individuals reached out to as part of the project

| Stakeholders | Outreach |
|---------------------------------|--------------|
| A. Students | 84,249 |
| B. Teachers/Parents | 4,466 |
| C. Households/Community Members | 6,014/24,056 |
| D. Direct Educates (A+B+C) | 112,771 |

Final reflections

Achieving a sustainable water, sanitation and hygiene education programme was critical, especially in the context of Project FLOW, because the impact of the programme will be far-reaching rather than immediate. The process of changing behaviour through education is incremental and ever evolving. However, it is important to note that no project reaps benefits without facing its own share of challenges. While weaving the project methodology into the daily functioning of schools was done periodically, there were practical difficulties at the level of target groups, which left the project team looking for viable solutions.

Firstly, security of equipment for the safe water infrastructure component was a major challenge. Most of the schools were understaffed and lacked security personnel; hence, it was reported that there was theft of taps and tanks in a few of the schools. Though the schools had taken ownership for the problem, the replacement took undue time due to a paucity of funds at the schools. To come up with a long-term solution to the problem of safeguarding

infrastructure, school WASH committees were created. The school WASH committees were formal groups within schools that comprised of external and internal stakeholders working on WASH education. These members took the challenge in their stride and sought solutions at the grass roots level. The members pooled available funds in addition to collecting two Indian rupees from each student per month to cover the recruitment of security staff.

Secondly, in close to 30 per cent of targeted schools, the student-teacher ratio was very high (1:55). Consequently, teachers were overburdened with existing curriculums and other daily chores. In order to facilitate Project FLOW within schools, the role of coordinating teachers was critical. The project team from RCE Delhi met with them regularly, providing them content and giving them enough platforms of recognition, which motivated them to work towards Project FLOW. These platforms of recognition were in the form of competitions such as the 'Best Teacher Award' that was given every year. In addition, selected best practices implemented by teachers to instil WASH behaviours in students were featured in the project's publication, the *Pravah...go with the FLOW* series. The team felt that in any future course of action, there is a need to work on the motivation of teachers and upgrade their skills so that they see themselves as 'leaders'.

Another challenge involved engaging parents in the concept of sustainability in relation to clean water and WASH. For instance, a school in Bhubaneswar city refused to cooperate in a community workshop over a concern parents' attendance would heighten the risk of theft of school property. To address this, informal teaching activities commenced off-campus and communication on WASH initiatives reached a wider audience, without any security issues.

Ever since the project was implemented, state initiatives on sanitation and development have been treated in such a way that the existing policies become streamlined with the project's interventions. In light of the Swachh Bharat Mission – an initiative of the Government of India in 2014 to achieve the vision of a 'Clean India' by October 2019 – there were two interactions with all six peri-urban communities to educate them on availing the benefits of the scheme. Similarly, some schools also took the onus on themselves and, through the block development officer, they undertook construction activities within the school site to update infrastructure. Synergies between education policies and other policy agenda should be capitalized on whenever possible.

While there are many policies aiding the SDGs, efforts should be made to form linkages wherever possible. More effort should be made to engage local intermediate level actors in the projects and ensure that schools and communities know where they can go for help if they face a problem they cannot solve.

Projects of this nature should consider working in partnership with other local institutions, helping to build the capacity of local institutions, while at the same time benefiting from their local knowledge, links and experiences, with the aim to leave behind stronger institutions when they exit.



'River Angels' Youth Water Protection Programme

RCE Hangzhou, China

Authors: Zhang Junlin, Pan Yaozhen, Fang Huiqing

SDGs to which the work contributes: 4, 6 and 11

Introduction

Water is one of the most important resources on which human society relies. In Hangzhou, the existing water crisis has mainly three aspects. Firstly, the majority of fresh water resources have been destroyed. According to the marine environmental bulletin, which is issued by the Government of Zhejiang Province, the ecosystem of Hangzhou Bay has been 'unhealthy' for four consecutive years. The Qiantang River, West Lake, and the Jinghang Canal all have varying levels of water pollution. Secondly, the treatment rate of urban pollution and waste is low. The level of control over industrial pollution is poor, but the treatment rate of waste from households is becoming an equally severe problem. Thirdly, the amount of acid rain is increasing. According to the environmental status bulletin of Hangzhou, the city has suffered from serious acid rain for over a decade. In 2015, most of Hangzhou witnessed heavy acid rain with the average pH value of 4.65. The acid rain rate was 84.0 per cent while the pH value of precipitation was between 3.25 and 7.62.

This water crisis seriously impacts the sustainable development of the city. Firstly, the life quality of residents is threatened. Hangzhou's drinkable per capita water capacity is about 1,600 m³, which is only 21 per cent of the world's average per capita water capacity. Secondly, the polluted water destroys the balance of the regions ecosystems and affects the food supply. Some freshwater sources have started to eutrophicate (becoming overly enriched with minerals and nutrients, which induces excessive growth of algae, and may result in oxygen depletion of the water body) and it has become difficult for aquatic life to survive in these water sources.

Our approach

The 'River Angels' Youth Water Protection Programme started in September 2018. The scheme has three targets: 1) Contributing to the development of clean water systems for Hangzhou city and thus helping to restore the balance of the area's ecological system; 2) Enhancing the competencies on how to promote sustainable development of the citizens of Hangzhou; and 3) Cultivating the next generation of leaders who will have awareness on sustainable development and will be able to think critically, solve complex problems and be creative in doing so.

The challenges and our principles

The challenges the programme sought to address were mainly related to the following three issues:

- 1) Many citizens in Hangzhou have not realized they are in a water crisis and are unaware of the problems related to this. This low awareness was identified in a survey in 2015, which revealed that 41.9 per cent of residents thought 'water is abundant in Hangzhou' and 39.9 per cent thought 'the supply and demand of water is balanced'. Most people do not know how to use water sparingly and they do not actively save water in their everyday lives.
- 2) There is no single solution to getting a clean water system for an ecological civilization. Hangzhou's economy has developed rapidly with a growth rate of over 10 per cent in recent years. Nevertheless, many areas, especially in the surrounding mountainous areas, remain underdeveloped. Thus, different stakeholders are generating different types of pollution that are impacting different bodies of water. Hence, there could not be a 'single solution' on how to implement water protection in the area. It is necessary to engage multiple stakeholders and have a multi-lateral approach in any programme seeking to address water pollution.
- 3) There is a lack of good curriculums and appropriate teachers to deliver successful programmes in schools. The third programme target (cultivating the next generations with critical thinking, problem solving and innovational skills) poses a challenge for traditional formal education systems that focus on subject matter expertise and on simpler cause-and-effect links. Administrators and educators need to be able to not just understand the complexity and the interconnectivity of the modern world, but also to be able to provide this information in further depth while encouraging learners to think of new alternative solutions.

In order to address these challenges, three principles were developed for the implementation phase of the project:

- 1) **Inclusiveness:** The programme committed to maintaining the mission and values in promoting water protection and reaching an ecological civilization, which is defined in national standards. This involved a respect for human diversity, regardless of

age, gender, ethnicity, educational level and/or socio-economic status. It stressed importance on knowledge and wisdom from every participant and adapted to value ideas and suggestions from all participants to promote sustainable solutions to the water scarcity issue. The combination of theory with practice was to be maintained.

- 2) **Innovation:** Technologies and solution-based strategies were promoted, which empower learners to critically examine the foundations of the issues and solve the issue at hand by engaging in their communities. Using collective wisdom and energy to provide solutions for the water crisis and the follow-up problems, the programme focuses on practical actions based on the combination of new innovations, as well as good communication.
- 3) **Transparency and accountability:** The programme committed to being open and honest in its practices, providing access to data records, creating feedback loops for improvement, modelling true learnings and distributing the accountability based on the different levels of voluntary systems.

The actions

For achieving the targets and overcoming the challenges, the initiative gradually built on four phases.

1. Learning about water and approaching water

ESD was integrated into school-based curriculums so as to better understand water and its relationship to human life as well as to the surrounding ecosystems. Firstly, students learned in classroom instruction about water and researched water quality in the class, watched videos on different water resources around the world and attended water topic activities in the school. Secondly, a series of interdisciplinary school-based activities were organized. Related to drawing/cultural classes, students participated in a Qiantang River painting activity in which the walls surrounding the river were decorated with motifs related to a sustainable lifestyle. In physical education classes, school football tournaments were organized. As a prerequisite for participation, students needed to pass a test on the seventeen SDGs. In music classes, students wrote songs and composed simple music pieces on water resources. Thirdly, students – now named 'River Angels' – were brought to water pollution areas in and out of Hangzhou to collect data and explore the water quality. These activities were interactive, student-centred and problem-based, which relates to how best to work on real issues later on in their lives.

2. Creating plans and inventions to protect water

Large-scale initiatives were launched for designing plans and ways for families, schools and communities to better use water in their surroundings. Students involved in this programme used modern information technology. They created an online data base for collecting information and data from different teams and schools of 'River Angels'. Analysis and reports were generated based on the data. An app was developed and

used to monitor the quality and frequency of water usage at homes and in schools. Students also designed equipment and systems for demonstrating the water cycle and life in water. Linking with traditional cultures such as poetry, music, drama and storytelling, new plans and ways were produced to advocate water protection for the students' families as well as in the surrounding community.

3. Dozens of teams were developed to protect the water in Hangzhou

All the schools participating in the 'River Angels' Youth Water Protection Programme had a special task for protecting a selected part of a real river or a stretch of canal. Regular observations and surveys were carried out and water cleaning activities were organized. Posters and leaflets were handed out to communities living around the rivers and the canals. This approach helped students to learn through action and they participated in forming their own communities.

4. Raising awareness on the concept of water protection in civil society through the active involvement of students

With the development of the programme, students walked out of schools and into city communities to raise awareness on water protection and water saving concepts. The programme also connected students and teachers from different districts to take action collectively. This approach created a network which more and more organizations such as enterprises, government departments and non-profit groups joined.

Outcomes

The 'River Angels' Youth Water Protection Programme started in September of 2018 and it has been expanded over the past year. Thirty-six schools were involved in the programme, with about 12,000 people participating in joint activities directly. Schools that have adopted the learning component into their curriculum educate over 100,000 students at the primary and middle school age. These learners then share their knowledge with their families and neighbourhoods, raising local knowledge. It is estimated that over 600,000 people have been influenced by the programme, either directly or indirectly.

Learning within the programme

Three levels of learning took place within the programme: learning among individuals, learning among organizations, and learning among the surrounding communities (society).

1) Learning among individuals

Individuals' learning mainly included three aspects that relate to knowledge, skills, and values and attitudes. By increasing knowledge, a detailed understanding of the impact of people's use of water on water resources, including footprint and risks, was developed. For skills, individuals' abilities were developed to analyse evidence, think critically about water-related issues and make decisions on what actions to take based on the principle of scarcity. By building knowledge and acquiring new skills, values and attitudes on water scarcity formed. On the individual level, students learned about the importance of balancing environmental, social and economic

aspects of sustainability while making everyday decisions. Through participating in water resource protection actions, students are trained to become local waterway protectors, environmental interpreters and solution innovators for protecting water resources. Through this programme, students can contribute to the treatment and development of their surrounding environment.

2) Learning among organizations

Besides primary schools, the programme has involved different organizations such as Zhejiang International Studies University, the German Hanns Seidel Foundation, Green Zhejiang and media representatives. As decisions were made unanimously, the facilitators from these different organizations learned how to develop curriculums, train teachers, support experimental learning outside of the school environment and how to disseminate knowledge into the surrounding community, both at local and national levels. Furthermore, the River Angels participated in international conferences on ESD. This way they could broaden their horizons, while also offering their knowledge and experiences to others.

3) Learning among the communities

Through the efforts of students and partners in RCE Hangzhou, the surrounding society was motivated to manage and invest in water resources in Hangzhou such as rivers, canals and lakes in a sustainable way. Projects, workshops, conferences and networks were produced to research and discuss water issues. Through these activities, public environmental awareness and a sense of social responsibility was stimulated. Companies, communities, the public sector and national as well as international NGOs were engaged in collective actions to address the issues around water pollution by learning about them.

The innovative aspects of the programme

1) Focusing on the development of students' responsibility and capacities

In contrast to merely implementing 'environmental education' programmes, the 'River Angels' Youth Water Protection Programme included economical and sociocultural aspects, in addition to education on natural sciences and the environment. Well-implemented ESD does not stop with simply measuring pollution levels or observing biodiversity, though these environmental aspects are crucial. Educators and students participating in the programme were required to ask questions such as 'what causes the quality of water change?' (economic aspects) and 'what does this mean for the surrounding society and the global community?' (sociocultural aspects). They were encouraged to reflect on how the behaviour of a single person can influence this complex equation. The programme also focused on developing students' civic responsibility and capacities for creating a sustainable future in their society.

2) Focusing on boosting awareness and activities to form a network

Existing school curricula and activities were just the starting point for the programme. From the very beginning of the initiative, it was aimed at promoting cooperation between schools, their surrounding communities and society in order to connect different people and organizations across the region to address a common issue. The principles of inclusiveness, transparency and accountability were designed to include local knowledge, community voices and existing actions as much as

possible. Gradually a special cooperation between students, their families, and the wider community (society) emerged around the issue.

3) Integrating information technology

Information technology was used to connect and communicate with people, as well as to facilitate data collection and analysis.

Final reflections

The programme has been conducted for a little over one year and it has been growing fast. Experiences and suggestions are presented below, which will hopefully lead to the expansion of this initiative.

New government policies that encourage education reforms

In 2013, the Chinese government released 'China's National Plan on Implementation of the 2030 Agenda for Sustainable Development'. The plan states that China will 'deepen education reforms, improve the quality of education and strengthen school sports and art education' and 'endeavour to strengthen students' sense of social responsibility, creativity and practical ability as a priority in national education'. ESD in China will require the comprehensive and continuous involvement of all educators. Moreover, by integrating resources from organizations outside the formal school system and encouraging their participation, this seeks to strengthen the abilities of educators and citizens as a whole. This policy encouraged a generation of different ESD programmes and the 'River Angels' Youth Water Protection Programme is one of them. Nevertheless, public awareness as stated in the introduction remains low and many components of the curricula have not been updated accordingly. Deeper reforms are needed to address this issue.

Experiences of the programme

Many difficulties were encountered during the programme, for example, low awareness on water pollution issues and environmental protection initiatives of the citizens; a lack of differing curriculums and teachers trained to teach the topics in schools; and traditional teaching methods that threaten to overwhelm new educational programmes. To overcome these challenges, the two following points are important for the successful implementation of this type of programme.

1) An inclusive and collaborative framework

An inclusive and collaborative framework should guide the implementation of any type of programme. The purposes, visions and values should be clear at the very beginning. With multi-stakeholder networks, the goals and objectives for different activities and approaches are varied, so a framework for integrating the comprehensive scope of the goals and activities is critical. This is helpful for moving plans forward, as well as for obtaining measurement and evaluation to support the continuation of the programme.

2) Strong leadership is essential

One benefit of multi-stakeholder networks is that, when an individual organization joins the programme, there can be a distribution of accountabilities of the programme. On the other hand, especially in China, if no one takes the responsibility for a programme or an activity, or a mix of different groups have conflicts of interests, very little gets done. An informed and committed leadership group should support the programme and having a leadership group rather than an individual means they can combine resources and integrate further organizations into the programme.

Impact for policy-making on water resources and educational programmes

The 'River Angels' Youth Water Protection Programme involved thousands of people. Some of these were working for government departments such as the Environment Department and the Water Office of the City of Hangzhou. The actions by the River Angels received attention from local government officials. Due to this engagement, the officials increased public investments for some particular affected parts of the rivers and canals. Furthermore, the 'River Angels' Youth Water Protection Programme contributed to a new educational paradigm for implementing ESD programmes in the city. From purely theoretical learning, more and more schools have changed their teaching methods towards action and problem-oriented practices aimed at developing students' responsibility, building awareness, and enforcing critical thinking, problem solving and creativity.

Suggestions for expanding the programme

1) Form a volunteer mechanism

In the aforementioned actions, a voluntary service team was created. This played a vital role. Volunteers promoted good morale and took responsibility for guiding and encouraging other students and citizens to participate in the cause and activities. Dozens of volunteer teams were formed to protect water resources. They all had different tasks and responsibilities. A good and organized volunteer mechanism will contribute to the expansion of programmes such as this.

2) Expertise support

Within the 'River Angels' Youth Water Protection Programme, local schools, Zhejiang International Studies University, the German Hanns Seidel Foundation and Green Zhejiang collaborated to develop curriculums and train teachers for the development of a new educational paradigm. The partnering organizations designed curricula, actions and conducted research on ESD. Moreover, through the organizers, a variety of foreign and local experts could be involved in the programme. This multi-level and multi-partner network model for incorporating experts in the design and implementation of action-based curriculum should be further enhanced.

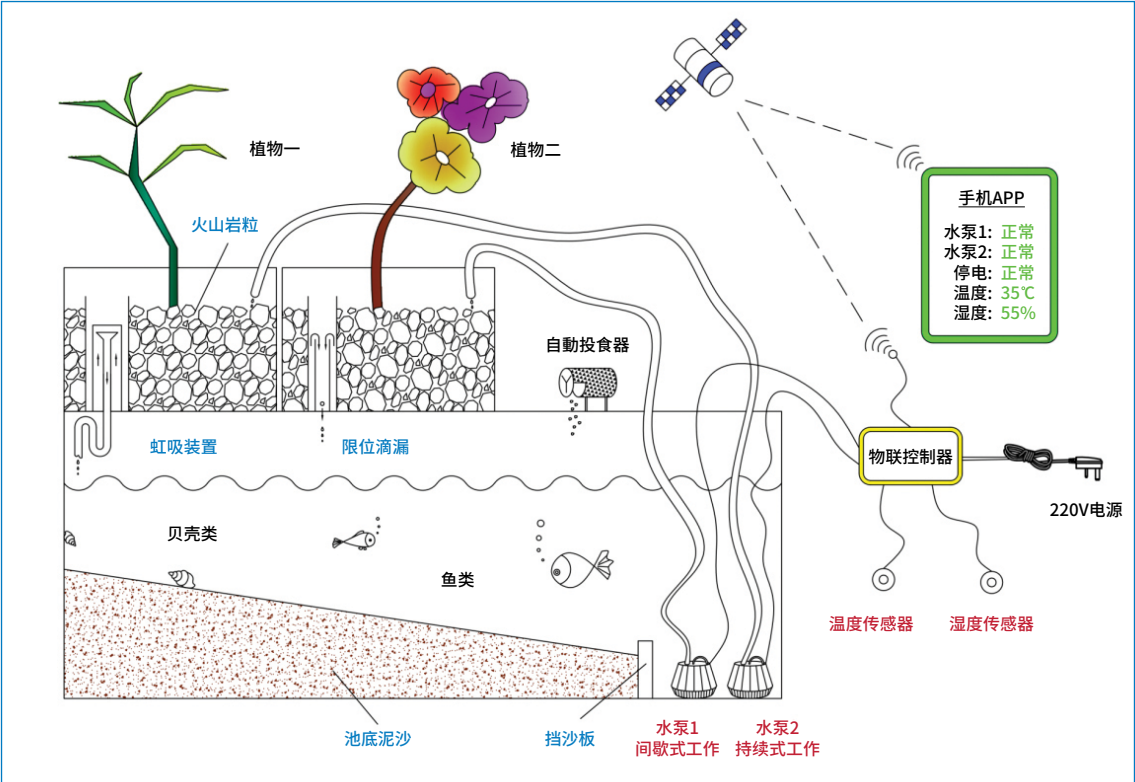


Figure 3: The fish and vegetable symbiosis system designed by a student.
(Image credit: © Fang Huiqing)



A global ESD dialogue on the complementarity of traditional and modern knowledge

The contribution of the Ise-Mikawa Bay River-Basins ESD model towards the global realization of the SDGs

RCE Chubu, Japan

Authors: Kinhide Mushakoji, Reita Furusawa

SDGs to which the work contributes: 4, 11, 12, 14, 15, 16 and 17

Introduction

RCE Chubu was developed in the first decade of the twenty-first century based on the assumption that the sustainability of the local region could not be unlinked from the unsustainability outside of the region in Japan, the rest of Asia, and the rest of the world.

The founding members of RCE Chubu all agreed to define the geo-historical region of RCE Chubu as the river-basin of all the rivers flowing into the Ise-Mikawa Bay, referring to it as a 'bio-river-basin'. This bio-river-basin is linked to the water cycle of the Nobi Plain, which is encircled by the Ibuki and Yoro mountain ranges in the West and by the Owari Hills in the East. Atsuo Tsuji, who was working on the conservation of the Fujimae Marshland, proposed applying the concept of Peter Berg's 'bio-region' to Central Japan¹ and called this region a bio-river-basin (*Seimei-Ryuiki-Ken*).

The rivers and canals' complex water cycles in the bio-river-basin have been modified by human hands – first to prevent flooding and then to use the turbulent water currents to generate electricity. These modifications produced negative consequences, concentrating

1 Cf. Berg, Peter (2009) *Envisioning Sustainability*. Sub-culture Books.

human settlements and work forces downstream and creating over-consumptive urbancentres in the process.

Furthermore, the building of dams impacted the mobility of different life forms, both upstream and downstream. RCE Chubu has had to concentrate on these negative aspects of the industrial development of the bio-river-basin that have resulted in local gaps between upstream, midstream and downstream portions of the basin. These gaps are structurally similar to the variety of ecological, political and economic gaps between the Global South and the Global North.

The unsustainable modernization of the bio-region is closely related to the introduction of exogenous development strategies, which had replaced the pre-existing indigenous traditional knowledge. This has been the basic incentive for RCE Chubu to develop its 'Bio-River-Basin ESD Model', which is based on the regional water cycles and stresses the importance of traditional endogenous knowledge which should be shared with other bio-regions, especially in the Asia-Pacific region.

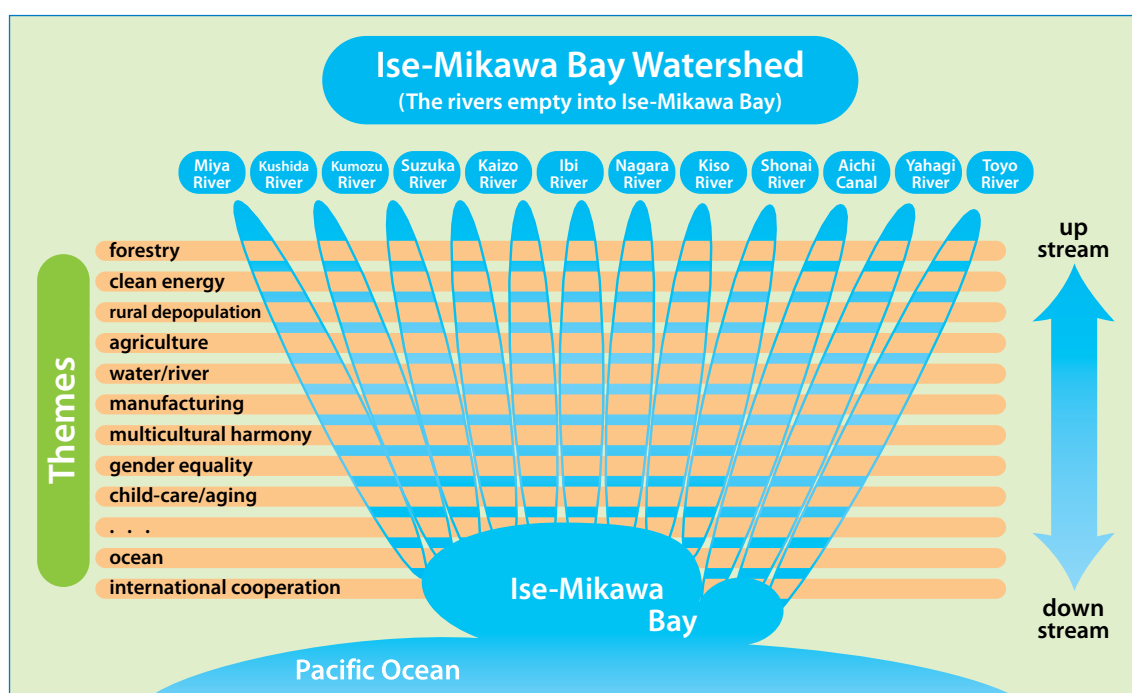


Figure 4: Major rivers in the Ise-Mikawa-Bay region and local issues regarding the up, middle and downstream areas.

(Image credit: © Reita Furusawa)²

² A Japanese version of this diagram has been published in R. Furusawa, 2019, *Jizoku-kanou na Hatten eno Chousen: Chubu ESD-kyoten ga Ayunda Kokuren ESD no Jyunen*, Nagoya, Fubaisha, p. 39.

Our approach

This report discusses one concrete case in which a global ESD dialogue took place with RCE Chubu during the Ise-Shima G7 Summit in May 2016. On the occasion of the summit, RCE Chubu took part in the Japan Civil Society Platform with the participation of citizens of G7 countries, as well as the international press. The reader should understand that this example presents only a small part of the discourse that started in 2008 and continued into 2019. The open forum during the Ise-Shima G7 Summit was, for RCE Chubu, only a phase of the global ESD dialogue, where the Ise Mikawa Bio-Regional Model was used in meeting Goals 16 and 17 of the SDGs.

Method

This ESD global dialogue focused on how to make the region more connected with global sustainability, a key question in linking the Chubu region with SDGs 16 and 17. The dialogue was conducted by using both online and face-to-face discussions. The online discourse was completely open and the diverse face-to-face discussions were determined by the different circumstances of the meetings. This report focuses on the face-to-face talks and analyses for the declaration, which was the outcome of the exchange of ideas during the Ise-Shima G7 Meeting of the Japan Civil Society Platform.

In autumn 2014, a UNESCO conference (UNESCO World Conference on ESD) concluding the DESD took place in Nagoya. This Nagoya ESD Conference was the occasion for RCE Chubu to make a public presentation of its model on the Ise-Mikawa Bay Bio-River-Basin ESD Model. Examples of multi-stakeholder ESD activities, mainly with local NGOs, from this time period include cases of teaching and learning about forest resource development in Neba Village – upstream on the Yahagi River and teaching about marshland conservation in the Fujimae Tidal Flats in Nagoya Port, and downstream on the Shonai River. Some ESD projects focused on teaching and learning about traditional food industries, some were on ecological education and some on historical research on aspects of the specific rivers.

Other ESD activities within RCE Chubu included:

- Teaching and learning about local eco-cultural products, including vegetable-dyed material in Toyota City – midstream on the Yahagi River – and preserving traditional knowledge on preparing little neck clams for the Kamesaki festival on the Chita Peninsula;
- Working on using education and training to rebuild upstream village communities, many of which were disappearing due to the massive out-migration of young people to big cities downstream;
- Engaging with the ‘Multi-Cultural Typhoon’ movement to educate and train non-Japanese migrant workers in the midstream and downstream regions of the Ise-Mikawa Rivers.

Analysis

The effects of this activity can be summarized in the following three points.

Firstly, mutual learning by participating members in the dialogue was achieved. The people who participated in this project were those who promoted ESD in their local area – mainly NGO leaders and university researchers. In the process of making a statement for the Ise-Shima Summit, the philosophy of the bio-regional ESD model, proposed by RCE Chubu, was clarified in the summary of the following three points of the model: local employment, developing human resources, and creating a shared future. In addition, it was discussed how to express these points using Japanese concepts that are also understood internationally. Although this mutual learning was done in the context of informal learning among limited numbers of citizens and NGO members in the region, the outcomes of the dialogue spread to the formal education system since many of the participants from the project teach in local schools.

Secondly, through this project, the method of the bio-regional ESD model has spread to domestic sustainable development stakeholders and people in various fields. These domestic experts were NGO leaders, university researchers and business people, with a total of about 100 organizations and 500 people, who were involved in the Citizens' Summit. The contents of the activity were reported by the Japanese media and articles were published in five newspapers. In the *Chunichi* newspaper, our proposal was widely reported as 'Proposing the sustainability of the Ise-Mikawa Bay River Basin Area at the Ise-Shima Summit'. Since the number of subscribers of the *Chunichi* newspaper in the Chubu area – Aichi, Gifu, and Mie prefectures – exceeds two million subscribers, RCE Chubu's philosophy and strategy was disseminated widely throughout the region.

The third point was that we were able to disseminate our pedagogy and advocacy internationally. RCE activities are regional ESD activities, but what is important is sharing good practices globally among regions. Mega international events, such as the G7 Summit, enable this information sharing. During the Ise-Shima Summit, we organized press conferences and evaluations of the communiqués with NGO members at the International Media Centre (IMC) at the Ise-Shima Summit. Also, the statement of the Citizens' Summit was delivered by a representative to the Japanese Ministry of Foreign Affairs. Furthermore, by reporting on RCE Chubu's Ise-Shima Summit activities at the UNU International RCE Conference on SDGs in 2017, such local efforts have become a source of global learning.

On the other hand, there are also challenges in dialogue activities at such international conferences. There are many local stakeholders who are not interested in international conferences. They sometimes criticize such advocacy activities by calling them 'air battles'. In other words, they advocate that local activities on the grounds are the most important, and spending time and effort on global dialogue is less important. Although RCEs have a primary goal of promoting ESD in a given local region, the secondary goal is to accelerate global mutual learning. Encouraging this understanding is a future challenge in our region.

The Ise-Mikawa Bay Bio-River-Basin ESD Model was the basis of the ESD dialogue for preparing a declaration to the governments and citizens of the industrialized G7 democracies on the occasion of the Ise-Shima G7 Summit. In this declaration, members of RCE Chubu discussed and analysed the Japanese traditional animist approach to education and sustainability, which is quite different from the neo-conservative security strategies and the neo-liberal financial market shared by the Atlantic G7 societies. We will use this model to link traditional knowledge to RCE efforts to contribute to the SDGs through international dialogue.

Water cycles, with their physical energy and chemical connection with life, are at the basis of the Bio-River-Basin ESD Model. We stress here the morphogenetic function of water in Japanese animism, which is one version of a trans-Pacific animistic civilization, with a close rapport with maritime animism, including the animism of the indigenous people of the American continent.

The Ise-Mikawa Bay River Basin ESD Model proposes a three-pronged programme for the re-building of local communities, which serve as the building blocks of sustainable bio-regional communities in all rivers of the Ise-Mikawa Bay Bio-River Basin. This programme was based on 1) *Mono-Zukuri*; 2) *Hito-Zukuri*; and 3) *Mirai-Zukuri*.

Traditional village communities in Japan have, within the annual calendar, two states. One is everyday life with work in the fields called *ke*. *Ke* is still water which can become polluted by its stagnation. This pollution is called *kegaré*, literally *ke* becoming impure. The other is *hare*, a time of fluctuation and purification. This is when stagnant water is washed away, bringing new spiritual energy.

The concepts of *ke* is at the basis of *mono-zukuri* – the shaping of things and production in everyday life – while *hare* is crucial in *hito-zukuri* – the shaping of persons through their participation in local community festivities and activities. A third aspect is also added to the ESD programme, called *mirai-zukuri*, the shaping of the future. Here, the future is framed as a desirable and sustainable situation to be built on the basis of production systems and humans, constituted by the three types of morpho-genesis, which are all connected by water, both cyclical and turbulent.

The traditional ethical concept of *mutsumi-ai* was proposed to Western members of the G7 to correct the excessive importance given to competition in the neo-liberal global financial economy. *Mutsumi-ai* means to ‘feel happy’ and ‘work together’. This approach to agricultural or industrial production is entirely different from the Western concept of production in a competing market. The importance of participating in a globalizing competition should not become an obstacle to this attitude, which also exists in the tradition of many Western cultures, including the Greek ethics-based philosophy *poiesis*.

Another concept within the model is *hito-zukuri*, the shaping of humans. The people themselves are shaped, especially during the *hare* periods when the village community purifies itself from a *ke* period’s stagnation. This activity is based on another ethical principle, *nagomi-ai*, to feel and act in a friendly and peaceful way, replacing hatred by peaceful mutual appreciation of others’ behaviour and intentions. This Japanese traditional value can

play an important role in replacing the Western modern emphasis on violent power and power-based security maintenance in domestic and international conflicts. The objective of *hito zukuri* suggested by the Ise-Mikawa Bay Rivers Basin ESD Model is to shape human agents of peace who understand the importance of breaking the modern belief in building peace on the readiness to use military violence. *Nagomi-ai* was the basis in the early modern period of the Edo Shogunate's peaceful rule of three centuries, without international and domestic violent conflicts.

Mirai is expected to shape a future in which humans are capable of living in peaceful communities where violence is forgotten. The future has to be shaped, with a mindset similar to the communal festivity mindfulness.

As the concept of 'mindfulness' begins to interest Western societies, *mirai-zukuri* should be a mindful engagement into the preparation of the future. The SDGs need a future spiritual engagement based on *kokoro-zashi*, a 'mindful engagement'.

This shaping of people who care about warmth and light is based on an animist mindset extremely close to what the *Kechua* indigenous people of Central America call *sumak kauzai*, to live fully and well within the harmony and joy of the universe. *Mirai zukuri* in Japan and in Central America are typical themes of SDG dialogue based on the shared values of Pacific animist civilizations.

Challenges

After the UNESCO World Conference on ESD, financial limitations have restricted RCE Chubu to hosting only one face-to-face dialogue with stakeholders from abroad, inviting participants from Least Developed Countries (LDCs) to Nagoya.

We had some linguistic difficulties in communicating about the model due to this financial limitation in hiring interpreters, but this was covered by consecutive interpretation by bilingual participants.

Both online and face-to-face talks have sometimes been too bureaucratic using the UN's ESD vocabulary, but we have been able to minimize such barriers thanks to a variety of stakeholders. We found that both the academic 'experts' and the citizen activists who were the true experts on civil communities were more successful in communicating than we expected them to be.

This was proof that the SDGs are helpful in motivating the academic and citizen 'experts' to avoid impasses due to their vocabulary. This was a facilitating condition for the international multi-stakeholders' dialogue.

Outcomes

Through the project, many stakeholders of RCE Chubu found that there was a traditional mindset in the pre-modern bio-region which held many positive lessons. We should take such lessons into consideration in our efforts to correct past and present mistakes

and to develop a sustainable model for the region to meet the requirements of ESD and, subsequently, the conditions of local SDG implementation.

We found that the Ise-Mikawa Bio-Region benefited from a rich system of local re-cycling water systems including underground water currents. Water has played and still plays a key role – both positive and negative – in both ecological and cultural manners of the Ise-Mikawa river basin.

In the global ESD dialogue, we realised the problems of incomplete mutual understanding between Western and non-Western ESD stakeholders (especially in regard to stresses on competition versus collaboration in education) is a hidden cause of the difficulties in achieving the various issues involved in SDG 16.

This is why UNESCO and the Office of the United Nations High Commissioner for Human Rights (OHCHR)'s efforts to study the complementarity between human rights and humanitarian law with a variety of non-Western and non-Abrahamic traditional values and institutions need to be promoted by different national civil societies as part of their efforts to achieve the targets in Goals 16 and 17 of the SDGs.

The global ESD dialogue provided an occasion for the organizers of the dialogue to realise the importance of the Ise-Mikawa Bio-Regional model, not only locally, but also as a means to develop endogenous intellectual creativity in all local regions towards the achievement of the sixteenth and seventeenth targets of the SDGs.

The global ESD dialogue which RCE Chubu engages with can become an efficient means to develop civilizational dialogue with and between different non-Western bio-regions to adjust their traditional values and institutions to the UN system of human rights and humanitarian law.

It is important to promote cultural endogenous creativity and develop a critical approach to maximize the commonalities between UN human rights and humanitarian law and the critically re-interpreted traditional values and institutional knowledge.

The global ESD dialogue promoting traditional knowledge and values should be closely connected with the efforts of the UN human rights system by contributing to the reconciliation between the UN exogenous human rights and humanitarian law and the non-Western traditional values endogenous applications in order to enrich the universality of the UN-promoted human rights and humanitarian law.

By presenting local traditional knowledge of the bio-region, this series of discussions is expected to contribute to the mutual understanding of the world in facing modern, contemporary problems using traditional values and practices to develop a sustainable implementation strategy for all citizens concerned with the SDGs, both locally and internationally.

It is an uninterrupted process of dialogue, encouraging whoever is involved to contribute, to compare notes and learn mutually on the diversity of issues, which need an accumulation of endogenous intellectual knowledge and values of the variety of local bio-regions constituting

the Earth. ESD needs this process of exchange of a variety of 'expertise', especially from local citizens, the true experts on local sustainability.

Furthermore, by embarking on the global ESD dialogue, RCE Chubu has begun discussions on issues related to gender equality and human rights by integrating its local phenomenon of women migrants with UN human rights and humanitarian law.

As Japanese society ages, Japan will need to welcome more migrants from other cultures in order to replace the retiring workers. Many of these migrants will be women from the Philippines and so RCE Chubu is planning a series of webinars on addressing the needs of Filipinas within the Chubu region, as well as these migrants' children.

These topics are closely connected to SDGs 16 and 17. RCE Chubu is also working on the creation of webinars to learn how Kurdish women and girls can be supported by members of the public in the Chubu region, with a special attention to the space human rights and humanitarian law will have to play in the coming years for women and girls in ethnic and religious minority communities.

Final reflections

As we saw already, the SDGs need to be promoted by an eco-cultural participatory democracy. The Ise-Mikawa Bio-River-Basin ESD Model can contribute to the development of a bottom-up process of pluralistic transformation of the global system, which can combine the forces of all stakeholders towards arriving at a global reconciliation between the West and the rest in regard to sustainable development.

The Ise-Mikawa Bio-River-Basin ESD Model will continue to organize an international dialogue combining virtual and face-to-face interactions whenever possible with the participation of experts on ESD, especially local citizens who know best their local problems and possess local wisdom. The dialogue will focus on the United Nations SDGs implementation before 2030.

The reported global ESD dialogue attempts to strengthen global, regional and national networking for SDGs by preparing civil society platforms such as Ise-Shima G7 and Osaka G20.

With more frequent face-to-face discussions at similar meetings, the global ESD dialogue can become an important tool to connect all RCEs and indeed a plethora of other actors in active participation on all 17 SDGs, especially Goals 16 and 17.

This dialogue can involve local and international concerned citizens and other stakeholders who want to benefit from international debates on the occasion of such events as the Tokyo 2020 Olympic Games.

This festival for peace and reconciliation coming ten years before the target date of the UN SDGs may be an appropriate occasion for a reconciliation between exogenous Atlantic liberalism and the endogenous values of the two non-Western movements towards sustainable development – Pacific animism and Eurasian axial religions.



Bridge to the World International Youth Camp

RCE Tongyeong, Republic of Korea

Authors: Bomyung Seo, Yeojin Yoon

SDGs to which the work contributes: 2, 6, 7 and 14

Introduction

These days, the whole world is more inter-connected than ever before – from our economic systems and cultures, to the movement of populations and the world’s ecosystems. Problems in one country can impact another country or the whole international community. In other words, we should be interested in and concerned about the various problems that occur, not only in our own countries in the present, but also about problems that occur around the world and their long-term implications. The way global problems such as climate change, natural disasters and poverty are presented in the media make these problems appear episodic and distant. It is important to develop educational programmes that can help people see these problems as connected to their own lives and communities and stress their ongoing nature. However, formal school systems are not always the only way to learn how to do this.

The competitive education system for Korean students has long been recognized as problematic. The pressure to score well in examinations in order to secure entrance to prestigious universities has been blamed as the cause of teenage depression and suicide rates that are among the highest in the world. In such a situation where there is great personal pressure to perfect knowledge for exams, it is not easy for these teenagers to think about what is going on around the world, nor is priority placed on how their individual and community actions are linked to these issues.

In response to this, RCE Tongyeong launched a programme to explore local problems connected to global issues among both Korean secondary students, as well as students from other RCEs around the world. Every five years, RCE Tongyeong holds an international youth camp gathering participants from various RCEs around the globe to share their community’s local problems and develop common solutions to them. In 2017, thirty-eight participants

from thirteen different countries shared issues and best practices related to water, energy, food and the ocean. They also created a youth declaration statement to spread knowledge generated from this camp to the global community.

Our approach

Bridge to the World (BTW) was designed in 2008 to give youth in Tongyeong City, who were relatively isolated from the information and opportunities available in larger cities in the Republic of Korea, an opportunity to design and take active ownership of their own future. Over the past decade, through RCE Tongyeong's BTW programme, young people in the city and from abroad have explored how they can address global sustainable development challenges within their own respective communities.

Participants select their own sustainability themes yearly according to relevant local issues and conduct research into solutions at the local, national and international levels. During the year-long programme, which includes a study trip to other RCEs around the world, young people have a chance to learn how to engage with sustainable development. Over the past decade, there have been over 700 participants in the 'Bridge to the World' programme and forty-seven RCEs or 'Sister Cities' of Tongyeong have participated.

In 2017, thirty-eight youth participants attended the second BTW International Youth Camp in Tongyeong, including twenty-two foreign participants from twelve different countries and sixteen youth from Tongyeong. Youth participants were selected based on a number of criteria, including an even distribution of boys and girls among the participants. During the Youth Camp, participants actively discussed issues and themes related to four of the SDGs, in particular SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 2 (Zero Hunger) and SDG 14 (Life Below Water), sharing their experiences in sustainable development from their own cities and communities. This camp's aim was to develop critical thinking skills about how local initiatives relate to global objectives on issues related to water, energy, food and oceans, thereby increasing global awareness and fostering global citizenship.

Analysis on multi-stakeholder involvement

1. The RCE Network: The camp was designed to invite youth from RCEs in cities where BTW participants had visited through the BTW programme over the preceding four years. Therefore, consistent communication with the RCE Network was of the utmost importance. RCE Tongyeong developed a concept paper and application form, which were distributed to both RCEs that visited Tongyeong, as well as RCEs that RCE Tongyeong visited. After interest was expressed by other RCEs, local and international participants who demonstrated a good understanding of the value of sustainable development and had expressed interest in local issues around sustainable development were chosen through a careful selection process. RCE Tongyeong offered return-flight tickets, an invitation letter and a visa request form for any international participants who were selected. During the lead-up to the camp,

RCE Tongyeong members guided the youth selection and developed the educational content for the programme.

2. Tongyeong City: The BTW programme is run by a Tongyeong City HR fund operated as a scholarship to students who demonstrate talent, but cannot fund their own education experiences due to economic conditions.
3. Yeondae Island: Yeondae Island is used as an island of zero fossil fuel, a base for eco-tourism. Tongyeong has built a sustainable energy experience centre on the island as well. The island and the centre allowed participants to learn about alternative energy.

Analysis on learning

This particular case approached SDGs 2, 6, 7 and 14 through the lens of SDG 4, Target 4.7 – providing quality education on sustainable development and global citizenship. Participants shared the problems within the country or city where their respective RCE is located and engaged with discussions, lectures and activities to resolve problems related to these SDGs with a solution for the problem based around the principles of sustainable development, taking into account social and environmental systems. Examples of how learning was embedded within the structure of the programme are provided in relation to SDG 2 (No Hunger) and SDG 6 (Clean Water and Sanitation) below:

- 1) Discussion on food: Before you can tackle a problem, you have to be aware of what the problem is. People are often innately aware of their own problems and youth are no exception. During the discussion on food, youth discussed what they perceived to be the dominant problem in relation to food for populations within their countries and cities. What was so intriguing about this exercise was how quickly the youth were able to recognize common patterns across similar ecosystems and similar levels of economic development. Youth participants from highly developed countries such as Australia, Canada, Japan and the Republic of Korea discussed how there was a difference in access to food between the rich and the poor within their own countries, noting poor communities in their countries were heavily dependent on cheap, fast, or instant food. This has resulted in a plethora of health problems disproportionately affecting poorer communities, including obesity, diabetes and hypertension. Youth from developing countries such as Cambodia, Indonesia, Kyrgyzstan and Vietnam noted that malnutrition was also an issue for their countries and this was more linked to seasonal famine. On the other hand, youth from countries with rapidly developing economies such as Malaysia and Nigeria noted desertification was a unifying challenge, with little agriculture extension services offered to educate farmers on the use of fertilizers and herbicides that accelerate the desertification of arable land.
- 2) Lecture on Rainwater: The Rainwater Research Institute team at Seoul University conducted a lecture on how to apply rainwater as a sustainable source of fresh water in real-world settings for resolving water shortage issues. During the lecture, researchers also addressed participants' misunderstandings about the nature of acid

rain and other innovative ways to use rainwater as a solution towards meeting water supply challenges. Through this lecture, youth had an opportunity to learn not only about the challenges facing the freshwater supply, but also concrete solutions they could enact in their own communities.

- 3) 'Rainwater Piggy Bank' Activity: During one of the preliminary training sessions before the start of the youth camp, local youth participants discovered that Dongpirang, a neighbourhood within Tongyeong famous for murals on the sides of its buildings, had experienced water access problems because of its higher elevation compared to other city districts. Although this problem had been resolved, the area was considered to be a good place to implement an activity around sustainable water use during the Youth Camp. The growth of Dongpirang as a tourist attraction prompted the city authority to install a public toilet facility in the heart of the 'mural district'. To capitalize on this development, youth camp participants took water facility provision to a higher level with the creation of a 'rainwater piggy bank' adjacent to these public toilets. The piggy bank is an installation that collects and purifies rainwater so tourists can wash their hands without the need to install sinks that would pull water from the local aquifer. The facility also allows Dongpirang residents to use it for watering their gardens and, when there is enough in supply, for cleaning the streets. In addition to installing the rainwater piggy bank, the young environmental activists made a mural to inform visitors about the importance of rainwater conservation. Finally, they gathered Dongpirang residents to initiate a series of residents' meetings to spread awareness about efficient use of the rainwater piggy bank.

Outcomes

Through discussion, lectures and activities, participants realized that water, energy, food and the world's oceans are closely related to each other and that problems in one area can affect other areas on a global scale. In addition, participants concluded that what they experienced and learned should be shared with more people and they developed strategies to inform local communities about what they had discovered. To do this, they prepared a variety of methods, including informal summit talks, a youth education marketplace and a youth declaration.

This youth statement made a rallying call to encourage the participation of various stakeholders in education and the implementation of sustainable development initiatives. In addition to those who participated in the programme, the youth group in the Tongyeong area, city hall staff, municipal councillors, local schoolteachers and the school board made a resolution to identify problems related to sustainable development issues and work towards solving them. In particular, city hall made a promise to improve the student activists' budget so they can continue to implement their pioneering environmental initiatives.

In addition to these positive developments, both teachers and school board officials promised youth activists that they would actively support those participating in sustainable development initiatives outside of the school curriculum, which represents a major shift in the standard operating procedures for any formal education system within the country.

The participants all returned to their respective schools, whether in Tongyeong city, in the Republic of Korea, or around the world and they shared their knowledge and ideas within their schools, local communities and with youth from other RCEs around the world. RCE Tongyeong manages this programme so students can continue to actively engage in sustainable development activities on a regular basis. Students continue to work with each other and other partners on the relevant issues and solutions to the problems they identified. They are encouraged and provided with support to meet and work with local policy-makers. In so doing, they receive all the relevant sustainability-related education and opportunities to ensure this innovative initiative will thrive.

Final reflections

Communication is critical in the follow-up of any programme focused on the environment and sustainability such as this one. The youth camp aimed to find and share problems at the local level; identify the global issues they relate to; find solutions to these problems; and go back to the local city to distribute the solutions through education and training programmes. For participants to share solutions to the problems with their communities, continuous communication with stakeholders is critical, as appropriate platforms and times must be agreed upon among the local partners – including local government, schools, community groups, NGOs, etc. – to facilitate the sharing of participants' experiences and knowledge. Ad hoc meetings arranged long after the participants return are not advised. Instead, meetings and platforms should be organized well in advance in anticipation of participants' return.

In addition, RCE Tongyeong usually used email to make contact with other RCEs, both in relation to content and logistical matters. This process was generally slow and less effective than communication through face-to-face meetings or telephone calls. Furthermore, participants could not efficiently share content they had created because there was no agreed upon mode for content sharing (email, messaging apps, social media platforms, etc.). Therefore, it is recommended that a common mode for sharing information is agreed upon early in the development of any programme, keeping in mind the type of communication platforms participants may or may not have access to. Agreeing to a shared mode of communication also better facilitates contact and maintains friendships after the programme.

Language barriers exist but this issue can be overcome

The programme was conducted in English; however, over 80 per cent of the participants came from countries where English is not the first language. In order to address this communication barrier, we recommended participants to make video or photo oriented presentations and content using simple language when working together during the organized programme, so this content can be adapted to the local language when participants return to their respective communities. Debate and discussion-based activities must also be approached with patience and good facilitation. While RCE Tongyeong noticed that not everyone was fluent in English, it was impressive how the participants could communicate well with each other through these suggested measures.

The way we live with differing cultures

For thirteen days and twelve nights, participants from different language groups, cultures and backgrounds ate the same food, at the same place, while doing the same programmes. However, it is important to provide an opportunity for participants to introduce their own cultures and backgrounds and to talk about things that are important to them. After this introduction, it is recommended to make rules to observe during the camp, or any other joint activity, that respects all participants' diversity, including their culture, religion and race. Through a session on creating these rules, participants can understand and learn about cultural differences within other countries, thereby giving them a sense of global citizenship. However, it is important to include a skilled facilitator for this process to guide participants through issues, such as the paradox of tolerance, and to maintain that everyone's humanity should be respected.

Funding

While the city government handled the funding for the programme in 2017, it is recommended that educators look for alternative funding sources for reoccurring ESD exchanges and capacity-building programmes such as this one. While local governments make great partners for generating content and accessing venues and resources during a programme, they often receive feedback from constituents that funds should be prioritized for local participants, not international participants. Therefore, it is highly recommended that RCEs look for multiple sources of funds for international programmes such as this one.

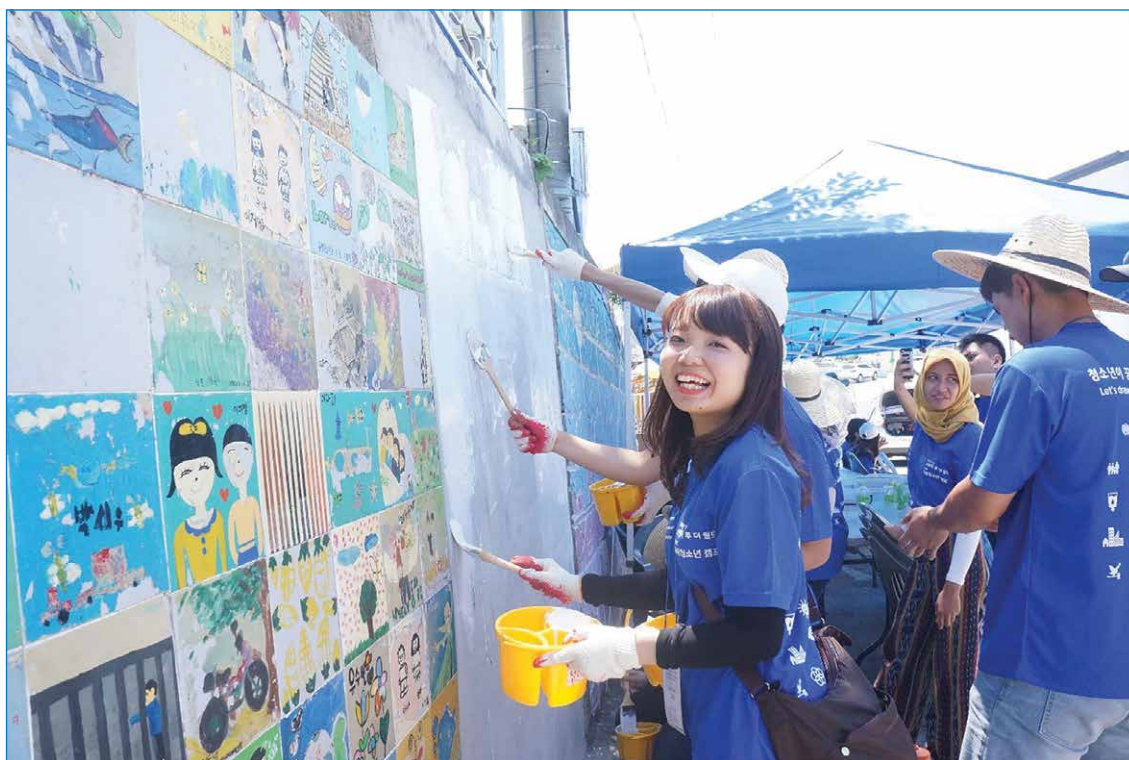


Figure 5: Colorful approach: Painting murals to raise awareness about water conservation.
(Image credit: © RCE Tongyeong)



Involving young generations in the conservation on agro-biodiversity in a rural area

RCE Hyogo-Kobe, Japan

Authors: Mieko Kiyono, Hideyuki Niwa, Akito Tai, Kazuhiko Shinotani

SDGs to which the work contributes: 4 and 15

Introduction

The rural landscape of Japan is a complex network of environments involving paddy fields, waterways and forested areas. This is referred to in the Japanese language as *satoyama*. This complex network not only accounts for the majority of agricultural land in the country, it also provides a habitat for wildlife. In fact, about 50 per cent of freshwater fish species and 8 per cent of frog species in Japan are found in the paddy field areas, according to data from the Ministry of Agriculture, Forestry and Fisheries (MAFF) in 2009. Many species of wildlife in rural areas have had their environments protected by farmers through this agricultural system. However, agricultural modernization – such as mechanization and changing land-use intensity – influences the agro-ecosystem, which means a loss of habitat for many species of frogs, fish and other wildlife. Unfortunately, there is a trade-off relationship between modern agriculture and biodiversity.

Against this background of the above threats, the ideas of ‘agro-biodiversity’ (biological diversity on lands used for agricultural process) and ‘agro-diversity’ (the many ways in which farmers use the natural biodiversity of the surrounding environment for production, including not only their choice of crops, but also their management of land, water and biota), have emerged. In relation to this concept, Globally Important Agricultural Heritage Systems (GIAHS) or Nationally Important Agricultural Heritage Systems (NIAHS) were designated in 2005 to conserve traditional agricultural systems for a sustainable future. Even though fifteen years have passed since the implementation of these two systems, they are not widely implemented nationwide. A stringent designation process has been cited as one of

the reasons implementation of GIAHS and NIAHS is limited across Japan (Please access the following link for more information: <http://www.fao.org/giahs/become-a-giahs/designation-process/en/>). This situation suggests that these certification systems cannot cover all activities related to creating and conserving all 'agro-biodiversity' in all areas.

This project focuses on the possibility of how a small scale challenge can have a potential for biodiversity conservation in rural areas, which connects to the conservation of endangered species (indicator 15.5.1 of the SDGs) and to zero hunger (indicator 2.2.4 of the SDGs). In addition to this, this project uses ESD to construct an agro-biodiversity system with multi-stakeholders – not only local government and leaders of farming villages, but also non-farmers and younger generations. This project is focused on how young generations can learn about and become involved in biodiversity conservation activities in rural areas.

Our approach

The project site was Tambasayama City in the Hyogo prefecture of Japan, located about one hour from the urban agglomeration of Osaka, Kyoto and Kobe. Tambasayama City has a population of 42,168 people and a total land area of 377.6 km², with 75 per cent of the total area forested. The main industry is agriculture and this area is known for crops such as black beans, yams and chestnuts. Since 2003, policies on biodiversity conservation have been advanced locally within Tambasayama City. Policies on the conservation of biodiversity in Tambasayama are focused on a balance of protecting living beings while preserving agriculture. As is the domestic trend around Japan, agricultural modernization and efficiency has progressed in Tambasayama City due to a declining population. This has made it difficult to run agricultural operations while preserving native wildlife. In order to solve such problems, Tambasayama City has been involving outside advisers in policy planning. Researchers from Kobe University and the Kyoto University of Advanced Science have been active in encouraging government policy-makers to manage the biodiversity of Tambasayama City more effectively since 2014.

This article focuses on the process RCE Hyogo-Kobe undertook to increase the involvement of younger generations, farmers and non-farmers in policy-making on biodiversity conservation. Research on biodiversity in rivers and in a canal construction project were chosen as stepping stones to understanding the way to involve multi-stakeholder participants in policy-making through education.

Water management in rural areas of Japan is primarily focused on the irrigation and drainage of canal systems that are constructed to manage water levels so that everyone in a community benefits equally. However, any type of waterway in a rural area runs the risk of flooding. Thus, there is a trade-off off between the types of canals. Canals constructed with concrete are easy to manage and have a long life. However, the biodiversity along these waterways is low. On the other hand, natural canals (shallow earth ditches) are hard to manage as they need digging regularly, are prone to flooding and often collapse during flooding. However, the biodiversity around these waterways is high. With this background information in mind, it is important to understand that canals for rice fields have changed from shallow earth ditches

(old style) to concrete-sided ditches (new style) in the last thirty years. This began to affect the abundance of many species, such as frogs, as early as the 1990s.

Nowadays, the restoration techniques of canals have been researched, which includes implications for the effectiveness of fish conservation. Research suggests that it is important to develop a good relationship and agreements with residents for the construction of a canal³. However, in many of these rural communities, young people are not involved in consensus building on issues such as infrastructure. Yet, they are an important factor in promoting biodiversity-friendly practices through what they have learned in formal education. Therefore, there is a need to involve young generations in canal construction to enable the achievement of a more sustainable future. Thus, this study focused on the trial of the multi-stakeholder involvement in canal construction in order to achieve biodiversity conservation.

Management of our project

This project by RCE Hyogo-Kobe involved Kobe University, which was responsible for the research and capacity-building components of the undertaking. The project took place over three years and also involved Tambasayama City, local high schools, local farmers and other members of the community. The project was greatly supported by all of the community's volunteer activities.

How younger generations were involved in the construction process of the canal in Tambasayama City

High school students were brought on board from two separate high schools. One was the Agricultural High School and the other was the General High School. Students from both schools participated in the RCE project as a form of NFE and not through a formal education process. For example, students participated in club activities with people from outside of their school.

How were high schools involved in relation to formal education?

While the field portion of this project did not involve formal education, high school teachers were also part of the field research. High school teachers in the prefecture were expected to join community activities as part of their social contribution to the city. The teachers used the data collected by the students and university researchers to make a presentation for an annual meeting among biologists in Hyogo prefecture. This was not only a valuable source of information about local biodiversity efforts within Hyogo, but it also served as a beneficial capacity-building exercise for the teachers themselves, as they were able to present their students' data to experts. RCE Hyogo-Kobe needed to obtain permission from the dean of both high schools at the beginning of the project; however, each year the teachers took it upon themselves to do this directly.

3 See, for example, S. Hasegawa, 2006, An Example of Crawfish (*cambaroides japonicus*)-friendly Rehabilitation of Drainage Canal, *Irrigation, Drainage and Rural Engineering Journal*, Vol.74, No.9, pp. 835–836, in Japanese.

Details on our process for creating 'agro-biodiversity' through our ESD project

To create 'agro-biodiversity' in the region, three different teaching and learning activities were carried out over the last four years as follows:

- 1) Basic research activities on health and the abundance of aquatic animals in waterways were conducted with the participation of University of Kobe researchers, high school teachers and high school students.
- 2) A platform was created for a series of explanations about what was found out by the research team in regard to aquatic animals for farmers and community residents after the basic research.
- 3) Finally, students and teachers taught farmers and community members how to research with them in order to monitor levels of biodiversity in their neighbourhoods and farms.

The basic research activities were held once per month. At the beginning, none of the high school students knew much about local biology or ecology, lacking knowledge of species' names and the ecology of the aquatic animals in the area.

However, with the university researchers and teachers' guidance, the students' knowledge began to grow to the point where they could take a picture of an aquatic organism on their phone and have their friends identify it.

In the beginning, after the field research, an explanation about each of the aquatic animals seen, including its species name and ecology, was done by researchers and teachers (specialists). But as the years passed, the role of explanation was moved from the specialists to the high school students, who did very well in explaining their knowledge and findings to community members.

The university researchers noticed that a specific explanation was important for high school students to understand what they saw and what they collected in the river as basic research progressed. At first, the university team was worried that high school students would be embarrassed in front of residents if they could not smoothly explain a species' lifecycle or role in the ecosystem.

Thus, the original intention was to leave the role of explanation to specialists during education events for community members. However, one high school teacher spoke to the university team and said, 'There is no shame in making a mistake. If they make a mistake, they can be corrected and continue to practice, that's all'. It was at this point that the RCE realized the project was not only just 'research' but also practice for the skills needed for a sustainable future.

Outcomes

What is the role of a residential coordinator in achieving 'agro-biodiversity'?

It was also realized how important a residential coordinator is in order for a project to proceed smoothly. The basic research activities conducted by the university and high school researchers were conducted without any problems.

However, opportunities to present the findings to the community were needed. The opportunities to do this were held five times over four years. When the university and high school research team prepared flyers for these events, the number of community members in the audience was limited. However, many community members came and participated when a residential coordinator was brought in to help coordinate the community events.

A residential coordinator is often a person who has moved into a village from outside of the community and has ideas or hopes for making the village community more active and engaged. The residential coordinator has the eyes of both a resident and an outsider. This type of person is important for importing new ideas such as 'agro-biodiversity' into a village in a rural area.

How have the high school students and teachers changed? What are the possibilities for service learning?

Now, both high school teachers and students have started to develop environmentally-friendly canals for protecting frogs as an outcome of this project. If the maintenance of these canals is at a lower cost than the canals residents are using now, it will be possible to reach a middle ground between biodiversity, human life efficiency and economic prosperity.

The construction of these environmentally-friendly canals was discussed with multiple stakeholders in the community. It is important for these young people to make a commitment to a policy on prioritization of biodiversity conservation in the canals of Tambasasayama City. These young people now serve as interpreters between residents and specialists about the importance of biodiversity in new canal construction. All of these activities may be taken on board as service learning for high schools in the area.

How have residents, including both farmers and non-farmers, changed?

In one village, an existing concrete canal kept the water level too low to support a habitat for any kind of aquatic species. Subsequently, a new environmentally-friendly canal was constructed. However, the water level needed to be maintained by residents after construction.

Now, the water level is voluntarily managed by the residents, which means they understand the value of the commitment to the canal as a mechanism for saving biodiversity. Residents

realize its value not only for the function of drainage, but also for maintaining the biodiversity of aquatic animals.

On the other hand, with the exception of the above case, most community residents have not changed their agricultural practices or their lifestyles, even though they have been educated about the importance of aquatic animals for healthy farms and ecosystems.

While change is observed in the behaviour of students and teachers, RCE Hyogo-Kobe must think of other strategies and may need to adopt a longer timeline for a project implementing behavioural change for community members, especially members of different generations who are used to different practices. Ironically, many older farmers are used to modern ways of managing the landscape.

To improve the biodiversity of rural waterways running near human settlements, it is important to take a multi-stakeholder approach which factors in the needs of all stakeholders, including wildlife species in need of conservation efforts.

This ESD project attempts to find a compromise on the value of biodiversity, human lifestyle efficiency and economic considerations. The project could show the way to reach a middle ground on biodiversity and human life efficiency. However, to reach a middle ground, expectations about economic return and convenience might have to be adjusted, including for older generations.



Figure 6: Before and after intervention:
The image on the right shows a re-constructed drainage canal.
(Image credit: © Mieko Kiyono)

Final reflections

GIAHS selection criteria consists of five elements: 1. Food and Livelihood Security; 2. Agro-Biodiversity; 3. Landscapes and Seascapes Features; 4. Cultures, Value Systems and Social Organizations; and 5. Local and Traditional Knowledge Systems. NIAHS has its own selection criteria. Another set of criteria for smaller areas than those covered by GIAHS or NIAHS is needed to encourage smaller villages that wish to conserve biodiversity.

By selecting a target or a goal to motivate a community, for example, reaching a level of 'agro-biodiversity', many best practices can be collected from Japan and around the globe in order to assist in achieving this.

Thus, RCE Hyogo-Kobe is planning to gather 'agro-biodiversity' projects and networks, both locally as well as with other RCEs around the world. The RCE hopes members from companies can collaborate on the balance of biodiversity, human life efficiency and the economy. Therefore, the sharing of best practices is recommended to assist in doing this.

This case study showed ESD practice at a local level. When working with communities in rural areas, we recommend projects think of ESD at the local level as an empowerment of all citizens of the community – farmers or non-farmers. In addition, lifestyle changes should be expected in ESD and not only from students within the educational system. To empower or change the lifestyles of almost all residents in a village is very difficult. People working with similar projects should always keep this difficulty in mind.



Engaging and learning for sustainable living

RCE Western Sydney University, Australia

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SDGs to which the work contributes: 3, 4, 6, 11 and 12

Introduction

Learning about sustainability – the ability to maintain healthy environmental, social and economic systems in balance, indefinitely, on a global and local scale while working towards the UN's SDGs – and taking action to make a difference in the way we live is becoming quite important due to population pressure, climate change and the way humans currently use our scarce natural resources. For this reason, engaging community through learning and implementing sustainable practices at the individual level are increasingly utilized to address issues of social and environmental concerns. Community education and engagement for sustainability reaches beyond simply producing a brochure to tell people what the problem is and how this can be resolved, or attending lectures or workshops to be updated and motivated. These methods are merely at the surface level of long-term engagement projects on ESD.

The aim of any effective community education project or programme is to develop a comprehensive understanding of the sustainability challenge, creating clarity about what process humans are trying to resolve; identifying the behaviour humans are trying to target and change; investigating the best ways to make this change happen; and providing a physical venue and resources to experientially learn and practise sustainability (NSW EPA, 2000).

According to community development literature and scientific practice, there are basic questions to ask before progressing towards a sustainable goal (Wals, 2007; Gai and Vivian, 2014). What is the place of learning in developing sustainable communities? How can such learning at the grassroots level be organized and facilitated while being aware of local values and needs? What are the underlying approaches or principles that will be a natural fit for such an initiative? Within the aim of effective community education and keeping in mind

the above questions, the Hawkesbury Earth Care Centre (HEC) was established in 1996 as a collaborative initiative that brought together local community, academic institutions and a range of other stakeholders in the Western Sydney region to address long-term sustainable development goals.

The Hawkesbury Earth Care Centre's history

HEC is located on the Hawkesbury Campus of Western Sydney University (WSU) in Richmond, New South Wales (NSW), Australia. It covers about 0.01 km² of land on the picturesque landscape of the campus and facilitates environmental education in the region. The community garden at HEC is used as a 'vehicle' for engagement and experiential learning about environmental management and sustainability. Participants can utilize the land, water, meeting area and garden, and other equipment for environmental learning. HEC is currently managed by the Henry Doubleday Research Association of Australia Inc. (HDRAA) with significant collaboration with WSU. The vision for HEC is summarized through the following statement:

“To stimulate awareness of the need to adopt more sustainable living practices and support efforts to do so and to develop the Centre as a place where people can gain inspiration, knowledge and skills through participation, demonstration and interactive learning.”

The HEC has been operating, predominantly on a volunteer capacity, with in-kind support from a number of stakeholders, and with WSU providing the field site. In the early 1990s, WSU staff and students, in collaboration with the local community and other organizations, formed the Hawkesbury Environmental Group (HEG). The group was fundamentally a coalition of interested networks and individuals who wanted to address specific concerns that are affecting sustainable living in the area. In particular, they wanted to address the issues of poor quality food, a need for low cost, environmentally-friendly housing, and the use of appropriate technologies that will promote sustainability. These concerns relate, directly or indirectly, to the ideas around the SDGs as now expressed by the United Nations (United Nations, 2019). Over time, the activities of the group grew and received increased recognition and support from within the community and the group was renamed the Hawkesbury Earth Care Centre as it is known today. At any time, HEC will have fifty to seventy active community members from the local community and university, with a total membership several times larger.

From its formative years, HEC has evolved as a community resource with a collaborative governance structure. It is operated interdependently with WSU for the benefit of its staff and students and the wider community. HEC has developed and nurtured regional connections, many with the partnership of RCE Greater Western Sydney – a United Nations University-recognized ESD centre based at the WSU Hawkesbury Campus.

The centre is largely self-funded through memberships with in-kind support from individuals, businesses and occasional minor grants from the government. There are no paid staff members and all work is carried out by volunteers.

Our approach

Approach to sustainability education: a theoretical framework

The overarching philosophy and holistic approach of HEC is inspired by the principles of permaculture and underpins strategies for working with community, communication, linking common agendas, sustainability and fostering greater collaboration across the region. Permaculture was a term coined by Bill Mollison and David Holmgren in the 1970s from combining two broad themes – permanent agriculture and permanent culture (Holmgren, 2013). It is about integrating land, resources, people and the environment to develop mutually beneficial synergies while achieving no waste and closed loop systems as seen in natural systems. Permaculture is also about holistic solutions that are applicable in rural and urban settings and can be used by individual households or large farms and corporations. By its very nature, permaculture is transdisciplinary in order to effectively address sustainability issues and challenges related to agriculture, water, energy, buildings, forestry, waste management, aquaculture, economics and community development. The core approach of permaculture is working with rather than against nature; acting through thoughtful observations rather than thoughtless actions; and looking at the whole system rather than considering only a component of a system. Permaculture espouses the ethics of planetary care, people care and fair share. These tenets serve to underpin all of the SDGs.

Utilizing this framework as the ethos of HEC allows for participants to acquire knowledge and skills for promoting sustainable development. The UN's SDGs of 2030 indicate that creating a knowledge platform is indicative of actualizing Goal 4. Specifically, the HEC provides context for SDG Target 4.7 by ensuring access for all learners to acquire skills to promote sustainable development.

Since its conception, HEC members have decided to use permaculture principles because of their value in bridging the gap between 'traditional' knowledge and practice with a 'systematic' (scientific) approach to problem-solving. Permaculture also offers ethics and principle-based educational tools that value local knowledge, customs and ecological conditions. Thus, the developmental activities of HEC are linked to the Global Action Programme (GAP) for ESD. At HEC and through its networks, there is exposure to a diverse range of social backgrounds, experiential learning and within RCE Greater Western Sydney, partners are identified and collaboration encouraged.

A consistent theme is organic agriculture, which has driven many of HEC's activities. The region is historically linked to food production and agricultural education in the Sydney metropolitan area since the early period of European settlement. There is also a rich indigenous aboriginal history with information on food production and natural resource use. Currently, agriculture in the district is in transition. Farmland is being converted into housing stock to cater for a growing urban population. Despite this change, urban agriculture is increasingly being recognized as an important component for sustainable living. Therefore, HEC has a significant role and focuses on the design of stable and resilient food production systems, housing, water conservation and management and waste recycling. HEC does this through education and integration of new knowledge bases and platforms for creating

design systems and alternative pathways to affect change. The ultimate aim is to progress towards healthy living and resilient communities.

Local sustainability challenges

Unlike many other communities globally who appear to suffer from limited resources, limited education and limited political power, the wider Western Sydney community have challenges that relate to widely accepted environmental decline, poverty of time, social isolation, political apathy, and a lack of contextual knowledge to realize a sustainable quality of life. A major challenge to sustainability in the Western Sydney region is that the citizens live in a relatively affluent area and could potentially contribute to a more sustainable lifestyle – if they choose to do so. Hunger is apparent in many ways and this is often dependent on context and culture. In the context of Western Sydney, hunger is largely absent, but obesity is a major problem, and it is likely that food literacy and links to soil and nutrition may provide the context for self-reflection and the decision to make more positive choices regarding sustainable and healthy living. The power of the citizen lies in their ability to:

- Learn sustainable development life practices through education and experimentation;
- Collaborate with elected representatives who set policies that influence, shape and guide the corporate sector and others;
- Modify consumption behaviour patterns of goods and services that demonstrate positive and synergistic qualities with the environment and are aligned with the UN's SDGs.

There are numerous existing unsustainable practices that exist in the context of this case study. The peri-urban setting of greater metropolitan Sydney is experiencing rapid urban encroachment on arable land and wilderness. For example, over the next ten years, 33,000 new homes will be built in the North-West of Sydney and once fully developed the area will be home to around 250,000 additional people (NSW Planning and Environment, 2019). This is likely exacerbated by high real estate costs and socio-economic tensions with struggling local businesses. This is also likely related to the limited awareness and actions on sustainable living and the availability of educational opportunities in general.

Like many other Australian cities, there is an increasing risk of daily exposure to toxic substances in Sydney's environment. There is increasing waste generation as identified by local government and decreasing nutritional food intake. All this is broadly related to the quality of food produced and prepared for consumption, while some may say there is a challenge of food security, food sovereignty, and a potential decrease in human health.

A relatively high dependence on non-renewable inputs also affects human energy costs and resource use in Sydney. This leads to decreasing quality of goods and services at affordable prices. As people rationalise landscapes, as is fashionable in the Western Sydney region, there is a decreasing overall level of biodiversity in the region. This puts pressure on ecosystems and services such a system provides to the community, which then impacts on system and community resilience (Schewenius et al., 2014). Past studies suggest that resilience helps

a community to sustain itself if people change their practices and, as such, resilience is an important indicator of social sustainability (Magis, 2010). Furthermore, the communities can build resilience by actively working together to develop the capacity that will help them to thrive when faced with change, uncertainty, unpredictability, surprise and sustainability challenges.

Due to the complex, multi-faceted nature of sustainability issues, many in the community may not be fully aware of the implications of their personal behaviour and actions on the SDGs. However, through the very act of bringing people together, HEC has provided a platform to explore strategies and actions to adopt sustainable living and improve the overall quality of life. For example, HEC is able to demonstrate and involve its members through activities such as rainwater harvesting on the site, recycling organic waste as fertiliser in the community garden and reducing energy use through demonstrations of HEC's low cost buildings constructed out of mud bricks and insulated through dried grass. As a result, these activities reinforced that it is possible to address many of the SDGs in an effective and natural way.

Engaging and networking for sustainability

Through its participants, HEC has been engaging with a number of agencies, individuals and networks across the region to promote sustainable living. Strong connections across disciplines at WSU – particularly in sustainable agriculture, environmental management, water management, social ecology, education and economics – enables HEC to work in a transdisciplinary way, while also engaging with the community. Students, as well as the general public, are encouraged to participate in the workshops taught by volunteers, as well as field days and community gardens where they are exposed to co-learning and adopt practices such as waste recycling, organic gardening and energy efficient construction. This creates an ideal environment where people can learn through engagement with activities.

HEC is designed to help participants engage with feedback loops and support them with ongoing learning processes. Many SDGs are interlinked such as SDG 1 (poverty), SDG 2 (hunger), SDG 3 (health), SDG 4 (education), SDG 11 (sustainable cities), SDG 12 (responsible production and consumption) and SDG 13 (climate action) (United Nations, 2019). All these SDGs are simultaneously addressed to some degree at HEC by using permaculture as a holistic management tool in the design process. The one key SDG that HEC specifically addresses is SDG 4 (quality education), in which all learners acquire the knowledge and skills needed to promote and practise sustainable development, particularly by implementing more sustainable lifestyle choices and behaviour.

Specifically, HEC uses an exploratory and problem-based learning approach with permaculture as a foundational core theoretical framework. The educational activities at HEC go beyond traditional literacy, numeracy and knowledge transfer activities. In particular, the activities provide an appropriate context (including appropriate social factors), practical subject knowledge, wide community connections and the use of experiential learning and critical thinking approaches. Permaculture is used to link all these activities in a holistic context based on personal values.

An important consideration that enables participants of HEC to be successful in addressing sustainable living challenges is the capacity that has been built through its partner network of RCE Greater Western Sydney to impart the knowledge, skills, values and attitudes that promote sustainable living to a plethora of partners in the community. The focus on experiential learning in an integrated, interconnected, and socially and aesthetically attractive setting is critical to doing this.

The approach taken by successive HEC participants and managers has allowed for innovative and participatory teaching and learning methods to evolve. This has occurred through a consultation process with a focus on community development. It included understanding the practical needs of practitioners and the input of the university's academic community. This helps in environmental education, which is transformative at the grassroots level and by its nature integrated, balanced and presented in a holistic manner based on fundamental human needs. For wider environment-oriented actions, creating motivation among participants, followed by specific actions, such as planting a crop that can be grown sustainably in the region, is the key to addressing sustainability challenges at the grassroots level (Dutta and Chandrasekharan, 2018).

Another important approach of HEC is that the education is delivered in both formal and informal settings while being mindful of the reality of lifelong and adult learning principles. This allows the education to reach people of all ages with learning that is flexible, initiated by learners, non-threatening and conducive to the development of personal connections. This is evident by the range of activities at HEC and the diverse range of participants – from nursing mothers and families to elderly pensioners. Other participants include staff and students from WSU, students from primary and secondary schools (including private, public and home schools) as well as international visitors. The settings are locally based, but often aligned to international best practices and contextually appropriate.

Examples of learning for sustainability

Key examples of how community garden activities at HEC have impacted engagement and allowed for learning about the SDGs by the participants can be summarized as follows:

Quality of life: Developing a sense of community within and between the individuals who volunteer at the HEC has consequently led to a sense of feeling connected with people having common interests and purpose. This can happen through cups of tea and chats, shared lunches, looking after each other's plots, collective watering and the sharing of grown crops. This human connection is an important component.

Sustainable development: Participants develop greater awareness of and connection to their environment, particularly awareness of weather and climate patterns and how these factors have an influence on the plants they cultivate. Participants who have worked in the garden over many years have experience of climate change and are motivated to think through what we can do about it.

Shared knowledge: Knowledge is shared through learning from others about successful gardening techniques, as well as learning about heirloom food recipes from other participants. In addition, many participants have had solar technology adopted in their own households after learning about and experiencing passive solar in the buildings at HEC and observing temperature differences and the degree of comfort in them.

Agency and actualization: Guided learning has led to a sense of mastery, expertise and self-sufficiency through exposure to 'how-to' make compost, grow food, look after worm farms, prune a tree, produce a newsletter, manage water in the garden and other related activities. All these give participants a sense of worth, mastery and independence. This way, they build confidence in their own abilities and contribute to sustainability goals.

Resilience: Broader community engagement makes people come together and inspires them by seeing how people at HEC put good ideas into practice and overcome psychological barriers. This way, they are able to demonstrate that it is possible to change for the better and achieve a sustainable way of living.

Belonging: HEC has become a place for resources and guidance on sustainability matters and thus the location becomes a 'go-to' place for the broader community to collaborate and find out how to do things sustainably and strategically. This is an example of an imbedded curriculum for global sustainable development at a local level.

Routine and habit development: Attitudinal change is another important example in which participants see others who they can relate to, but are different. Attitudinal change is also stimulated by recognition of economic benefits, especially growing their own food, which allows participants to discover personal and community outcomes and impacts for long-term sustainable development.

Outcomes

The physical environment plays an important role in reinforcing learning at RCE Greater Western Sydney in positive ways. There is also an assumption that social settings reinforce positive behaviour that may impact sustainable development. The physical location of HEC for instance, and the way people are encouraged to work together at it helps in developing a close relationship among participants, as well as between participants and the physical surroundings, most visibly through plants grown in the community garden and participants supporting each other to learn.

Much of the food at HEC is grown close to the kitchen with waste easily recycled through worm farms, where nutrient and beneficial microbes are added to the soil. There is good sun access to the building during winter and food production in the community garden is engineered to avoid the damaging effects of wind. Windbreaks at the HEC site help reduce climatic extremes and thus create more comfortable microclimates and natural habitats. Water at the HEC site is harvested and used on site for a variety of benefits, including drinking water and for the community garden. All these on-site demonstrations help participants to engage, observe and experience sustainable living options, often leading to the adoption of sustainable practices in their daily lives. Furthermore, experience-based learning

is particularly important in addressing attitudes and behaviours of learners and the changes resulting from such learning will last longer than those that result from teacher-directed learning in classrooms (Ballantyne and Packer, 2008).

HEC, through its collaborators at RCE Greater Western Sydney, gathers data and feedback, which is then used to reflect, improve and share with the wider community. Over the last two decades, HEC has provided experiential learning opportunities to thousands of people from both the local and international community through tours, workshops, educational open days and hands-on activities. This has provided both long- and short-term benefits for participants. Some participants, such as students and community members, attended courses on organic gardening at HEC and have received ongoing benefits through sharing knowledge about developing their own gardens and locally sourcing their own food. They have also benefitted through reflection, social connections, access to healthy food and a more sustainable quality of life.

The outcomes from involvement in HEC's activities, such as better soil fertility from composting, can be assessed to some extent through the feedback received from the participants and reporting of behaviour, attitude, or routine changes in participant's lives. In particular, any behavioural change expressed by the participants can be used to gauge success in implementing sustainable development practices within the community. The benefit of the HEC as a local resource can be summed by a quote from an HEC lecturer:

“Overall the students were very positive regarding Earth Care as an entity, its role as an education centre and their ability to have the field trip to the site.”

HEC's role as a practical educational facility linking RCE Greater Western Sydney members can be demonstrated from the following narrative quotes from university students who participated in learning activities:

“The information learned was very inspiring – especially being surprised about being able to grow edible food in water.”

“This place is awesome! It exposes students to a whole variety of ways to become eco-warriors and help sustain the planet! I would love to see sessions to help teach permaculture so that people can apply it in their own homes.”

“The site is highly informative in explaining the fundamental concepts of environmental adaptability. It is absolutely in all sense to highlight its importance for those who are keen on knowing about the environment and the ecosystems that surrounds us.”

“This Earth Care Centre was beneficial in reminding me about the importance of preserving the ecosystem – things that I forgot from primary and has influenced me to think about my own ways of contributing to the environment.”

“This experience made me more aware of the earth's delicate and finite existence and how sustainability is vital to the human race's survival.”

Final reflections

There are numerous insights that have emerged and are important for sustaining HEC into the future. Additionally, lessons from our own experiences may be of use for others who wish to establish a similar centre elsewhere, or are struggling with their community-based environmental education initiative.

Consistent funding for resources and activities remains an ongoing challenge. The future of HEC requires that a right balance be maintained of community responsibility, personal benefits (entrepreneurship and innovation) and a degree of risk (challenges). There are a number of specific insights and lessons that can be considered to build on the success of HEC:

- Contextualize local issues to global goals: Continued liaisons with allied associations help maintain a sense of the extended social environment of other actors who aspire to environmental 'better practices' directly linked to the UN's SDGs. This can best be achieved through appropriate management structures which draw from more highly developed notions of less hierarchical leadership.
- Global academic relationships: Connections to more formal educational contexts, such as academic institutions, provide rigor and a more global responsibility to the contextualized learning situation. Effective communications between multi-tiered stakeholders are also of paramount importance. This is a challenge when dealing with a wide range of individuals and organizations. Engagement with academic support (experts) contextualizes engagement to help understand 'What is relevant?' and 'How is this relevant?' in conjunction to ESD. This is important for the benefit of learners, as well as the extended network of academic institutions.
- Relationship development and maintenance: The development of networks and partnerships is essential in sustainability learning. Apart from internal collaboration with both academic and non-academic partners, there is a benefit in the development of relationships with individuals and cross-cultural 'sustainability' organizations with diverse environmental views outside any one organization. This helps to proliferate a diversity of ideas and open mindedness to assist change management.
- Reflection process-based systems thinking: This is about evolving the responsibility for decision making among the community members. It is important to invite participants into problem solving, critical thinking and the sharing of decision making. By identifying common agendas explored through coalitions that are inclusive and comprehensive, we can develop better practice in co-habitation that will allow for more efficient use of resources on synergistic cooperation. This places the learner in an opportune position and provides a personal experience that can lead to the development of a more sustainable society.
- Communicate and share knowledge: Barriers to learning opportunities are an important consideration while designing sustainability learning programmes, particularly

identifying blocks to the adoption of new ideas and better ways of relating. Identifying these challenges can come from the interaction of the academic community, as well as other partners in an RCE or any other ESD network.

- **Structure and tools:** Management of HEC and its programmes includes maintaining the administration of running a facility, mostly with volunteers. Promoting HEC through effective communications and marketing is important for its future growth and, at the same time, for keeping abreast of developments in current technology and opportunities in local, regional, national, or global areas. Permaculture is a valuable design tool and it can be used in many ways to engage participants in a practical way. It helps by relating to personal experiences and connecting with landscapes and surroundings in an interactive way.

HEC provides a real life communal setting for education on sustainable development with collaborative governance through RCE Greater Western Sydney that is based in a peri-urban environment that is typical in many ways of urban areas worldwide. By identifying common agendas, explored through coalitions that are inclusive and comprehensive, we can develop better practices in co-habitation that will allow for more efficient use of resources and other outcomes that address the UN's SDGs by 2030. Interactions become an expression of community and can lead to changes in behaviour. This outcome can lead to greater sustainability practices in many manifestations such as vegetarian cooking skills, worm farm maintenance and solar panel connection. This process of engaging in environmental practices in a community setting is dynamic and likely to co-evolve through co-learning.

Working with multi-stakeholders in the context of HEC, most participants are not in a position to directly determine policies of the numerous government agencies that are part of the network; instead, they are predominantly present on a grassroots and volunteer basis. However, the collective actions of individuals are likely to influence policies developed by influential institutions, including local government, councils and academic institutions. Financial support from a government programme and other sources is valuable, but care should be exercised so as not to hinder initiatives that may stifle creativity and replace learning opportunities. Each part of the network is interdependent and the different foci of different network members require careful management. This process is done by cultivating mutual respect between stakeholders and ensuring effective communication throughout a complex system.

By undertaking this case study, there has been recognition of the efforts made by the participants in working on a community solution to the problems of continued economic and civic development in the Western Sydney region. There has been an appreciation of the value of working on common agendas at a grassroots level to address basic human needs that also symbiotically benefit the wider community. Building a community educational facility and an RCE network for sustainable living is time consuming, requires patience and effort, and often puts pressure on individuals to sustain its ongoing success. Academic institutions, along with advocates and change agents, such as WSU and HEC, demonstrate ongoing collaborative partnerships to promote ESD and advance sustainable development practices through it.

In general, the facility and the network developed here build a greater resilience in the community to both address future sustainability challenges and adopt sustainable living practices at the grass-roots level in the long term. It also provides a greater sense of empowerment when people come together to create opportunities and persevere when challenges arise.

The physical environment and sense of place or belonging plays an important and vital role in reinforcing learning in positive ways. It potentially satisfies fundamental needs that make people feel good about their place in life.

Permaculture is a valuable design tool and theoretical framework used to help create satisfying places that reinforce the importance of the natural world and how we can create, manage and interact with it in a more sustainable and natural way.

The positive relationships between humans and the environment can result in fundamental rewards, not least of which is the adoption of long-term resilience practices.



Figure 7: The community garden at the Hawkesbury Earth Care Centre is an important facility for participants of all ages to learn ecological practices and experience sustainability in a practical, hands-on way.

(Image credit: © Eric Brocken)

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Urban biodiversity conservation and education in Western Sydney Cumberland Stepping Stones Community Corridor: A long-term endeavour and ongoing challenge

RCE Greater Western Sydney, Australia

Authors: Jen Dollin, Brittany Hardiman, Margaret Somerville

SDGs to which the work contributes: 4, 11 and 15

Introduction

"... This Cumberland Stepping Stones raises the profile of connectivity in a landscape that's really fragmented and really struggling to retain biodiversity and fauna and that's what's so important about it. So if one child can take home the fact that they've planted a tree that links in with the trees over at the next local high school or in some council reserve or some such thing ... It's not a concept that comes naturally to people these days because of the disturbed landscape we live in..." — Project Participant

The Western Sydney region is undergoing rapid urban development due to population pressures. Cumberland Plain Woodland (CPW) are critically endangered ecological plant communities endemic to this region. As a result of extensive clearing for agriculture and urban development, these plant communities have been reduced to less than 6 per cent of their original extent. Remnant patches are present but are small and scattered, degraded by human disturbances and weed invasion. The Cumberland Stepping Stones (CSS) Community Corridor explores how large-scale habitat restoration and conservation can be supported by intelligently and appropriately designed community engagement and education programmes. The initiative is connected with all levels of education, from formal to informal,

and across school, corporate and community sectors. The findings stress the importance of a long-term bipartisan government commitment and a cohesive strategy and vision for urban conservation in Western Sydney, connecting this to place-based environmental education, learning and action. It is critical to encourage more Australians – individuals, groups and corporations – to participate in activities that support their local natural places and to understand that this undertaking is a long-term endeavour. This CSS Community Corridor project is a model framework for this work moving forward.

Our approach

Multi-stakeholder involvement

The Cumberland Conservation Corridor was an ambitious initiative led by Greening Australia delivered in 2016 and 2017. Greening Australia is an environmental not-for-profit organization that works on major programmes that restore landscapes and is an RCE Greater Western Sydney partner. This project involved multiple RCE partners along with Greening Australia and Western Sydney University (WSU) that included the schools network, local councils and Bushcare groups. The aim was to enhance the ecological connectivity of the CPW with large-scale efforts on public estates, parks and reserves, and to educate the community on why this was so important.

Recognizing the importance of engaging people in active environmental restoration, Greening Australia included a strong community engagement component. The CSS initiative was developed to engage the general public, school and corporate communities in practical environmental action and education.

In 2016, Greening Australia was awarded a AU\$2.889 million '20 Million Trees Cumberland Conservation Corridor' government grant to support ongoing conservation efforts across this corridor with the aim of enhancing ecological connectivity. It was through this grant that the 'community corridor' work was feasible and further built on the existing partnership between Greening Australia and WSU through the RCE. The other stakeholders were targeted as four key participant groups – schools, corporate volunteers, community Bushcare groups and private landholders – across six Western Sydney local government areas that undertook both planting activities and community education within the project. The community corridor project engaged over 3,000 people, the majority of whom were primary and secondary school students. The provision of plants, logistics support, risk assessments and importantly funding provided by Greening Australia ensured that the project was accessible and affordable. WSU undertook evaluation of the CSS programme as part of the partnership through a three-member project team to collect and analyse project data and report on the findings.

This study provides empirical evidence from target participants that outlines the challenges

and opportunities for long-term biodiversity conservation at a very local level. It is evident from the study responses that ongoing commitment, learning and observation are essential for long-term biodiversity conservation. People need to learn what biodiversity is, how to recognize it, and what they can do in the long term to enhance biodiversity, beyond increasing the quantity of plants or the number of species in a given area.

Each group that Greening Australia targeted in this project has a part to play in the ongoing efforts of biodiversity conservation in Western Sydney. The performance of Greening Australia's staff in implementing the project should be considered central to the project's success, particularly for the school and corporate sectors. The provision of plants, logistics support, risk assessments and importantly, funding ensured that the project was both accessible and affordable.

Analysis on learning

The learning for the CSS project was undertaken across six Western Sydney local government areas. Using these places was very important to the methodology used in the CSS evaluation. As stated, the community corridor project engaged over 3,000 people.



Figure 8: Corporate planting day of local Australian native species at Oxley Park site in Western Sydney. (Image credit: © Brittany Hardiman)

The concept of 'place' was used as a conceptual framework for the study. Place links global concerns to local issues and is attuned to the specifics of people and their connection to their local environment. The research team acknowledges that a clear limitation of this study is the short timeframe in which to evaluate the impacts of this methodology for biodiversity conservation. Ideally, this study should be longitudinal to explore outcomes over the long term. The CSS project was implemented and evaluated over 2016 and 2017.

The study was designed using a mixed-methods methodology and gathered qualitative and some quantitative data through online surveys, individual interviews, focus groups, oral place stories and field notes and observations. The study evaluation techniques employed a primary analysis for each target group and a meta-analysis based on a summative evaluation for the entire programme. The meta-analysis considered project process, efficiency, effectiveness, outcomes and learnings. For each targeted community group, the data was analysed according to the data collection instrument. The schools' survey data was collated in charts and free text from the online survey responses. The corporate events were analysed using an inductive approach based on the individual interview responses, researcher visuals and field notes, with major themes identified and outliers noted. A similar process was undertaken for the Bushcare focus groups. The private landholder interviews were recorded onsite as oral place stories and these were analysed using a storyline analysis framework.

Across the community corridor, 40 schools engaged with the project, with an estimated 2,400 students, teachers and parents involved. Schools engaged with the project for varying reasons – landscape vegetation, habitat construction, garden infill, screen planting and shade trees – and encouragingly, 90 per cent of respondent schools indicated that their students continued to visit and care for their plantings. There is some early anecdotal evidence for these young plants creating their own microhabitats, with increased insect and bird activity noted. The learning that was reported on included discussions/conversations regarding the planting activity and many linked this closely with conversations about the environment and local fauna.

Students also had conversations about their own gardens and future activities. A few schools implemented the planting as an extra-curricular activity for student volunteers and clubs. The majority of schools indicated they used the planting event as a pedagogical tool.

Greening Australia faced a number of challenges while engaging with schools, but most prominently was the risk associated with the activity and getting the initial buy-in from the schools to participate in the programme. Schools are well placed, with the right operational structures, to implement, support and most importantly, maintain small-scale plantings for biodiversity conservation on their sites and they should continue to be a crucial target sector for biodiversity programmes.

The community corridor project hosted ten corporate events with some 300 volunteers at the Oxley Park Ropes Creek site. Personnel who compiled this report attended three of these events and individually interviewed sixteen volunteers. The importance to these corporate

volunteers of 'giving back to the community' and the pride associated with their work was evident. The educational component of the day was evident from all the participants interviewed.

Prior to participation in the event, knowledge of Western Sydney's bushland and the Western Sydney area in general was limited. Most of the participants cited facts they had learnt during their morning orientation, including that there is only 'five per cent left' or 'it's getting smaller' when referring to the CPW.

Many could link their newfound knowledge back to the importance of restoration in a systemic way and spoke not just about planting native flora but about its importance for wildlife connectivity and mobility and the negative impacts of development occurring rapidly across the region. The CSS event planting had a strong educational and social benefit for the volunteers and resulted in an immediate onsite impact. Focus groups with two local Bushcare groups were conducted and oral place stories were recorded with two private landholders. It was evident that both these cohorts have a deep and personal connection to their local places that extends over time. For these groups, no formal learning was provided. Instead, their learning evolves over time as they participate, share and care for their local places. The Bushcare participants acquired a broad range of new knowledge, including the importance of plants, differences between native and invasive weeds, and general information about the environment.

One of the main benefits of the programme is its clearly evidenced educational potential over a long period of time, which is what is required for biodiversity conservation. Given the right support, their dedication makes them – and these sites – well situated for long-term ongoing action and more one-off planting events to improve connectivity in their local places.

The CSS project was another source of support for these cohorts who take a long-term view of conservation work. A major issue for the private landholders is the interest, or disinterest, of adjoining neighbours. When owners of adjacent properties are not engaged in or do not understand the reasons for environmental action, the work of the individual landholder can still be rewarding but may be isolating. Similar issues can be seen with Bushcare groups and the sporadic nature of the involvement of their volunteers.

Outcomes

A project participant stated: '... This Cumberland Stepping Stones [project] raises the profile of connectivity in a landscape that's really fragmented and really struggling to retain biodiversity and fauna and that's what's so important about it. So, if one child can take home the fact that they've planted a tree that links in with the trees over at the next local high school or in some council reserve or some such thing ... It's not a concept that comes naturally to people these days because of the disturbed landscape we live in...'

The project was successful in its aims of engaging the general public, school and corporate communities in practical and immediate environmental action. A purposeful ESD design that enables some 3,000 community members to be involved in hands-on activities was a large-scale undertaking that demonstrated vision and commitment by Greening Australia to deliver on-the-ground outcomes, combined with community education. As a result of the CSS project, there was an immediate output of 75,000 seedlings planted across target areas. How significant this will be to long-term biodiversity conservation remains to be seen.

ESD actions

1. The CSS initiative was developed and designed to engage the general community, local landholders, schools and corporate volunteers in practical environmental action and education. It specifically provided the opportunity and resources to support local communities to care for their local places. The corporate volunteer days expanded this reach into new groups.
2. The aim of the CSS project was to enhance ecological connectivity of the Critically Endangered Ecological Community Cumberland Plain Woodland and to protect and safeguard its native flora and fauna. The Cumberland Plain Woodland is located within a development corridor in Western Sydney where it is critical to plan for greenspaces and biodiversity. These public and private reserves provide positive environmental sustainability corridors for our region. By involving the community in its conservation and restoration, these messages are passed on through learning and knowledge sharing.
3. Greening Australia, the programme lead within RCE Greater Western Sydney, has taken urgent action to enhance ecological connectivity by revegetating cleared land in three regional corridors across the Cumberland Plain Woodland in Greater Western Sydney. Greening Australia planted a diverse mix of over 421,300 seedlings with 18 per cent of these sown by the community. The programme's main on-ground activities are focused on national parks and reserves. A variety of innovative techniques are used. These include direct seeding techniques, tubestock revegetation (young plants which have been grown to the point where they are ready for either planting out in the field, or potting on to larger pot sizes) and habitat enhancement (designed to increase ecological function). The project is centred on key identified wildlife species. It also involves the 'Green Army', an Australian government initiative open to young people to develop their base skills, gain training opportunities and acquire conservation experience. This initiative enables participants to support site maintenance, weeding, watering and monitoring. Community sites are maintained and managed by their owners, i.e., school groups and private landholders on their own land.

It is evident from these groups that ongoing learning and observation is essential for long-term biodiversity conservation. People need to learn what biodiversity is, how to recognize it, and what they can do in the long term to enhance it – beyond just the addition of more plants or more species of plants.

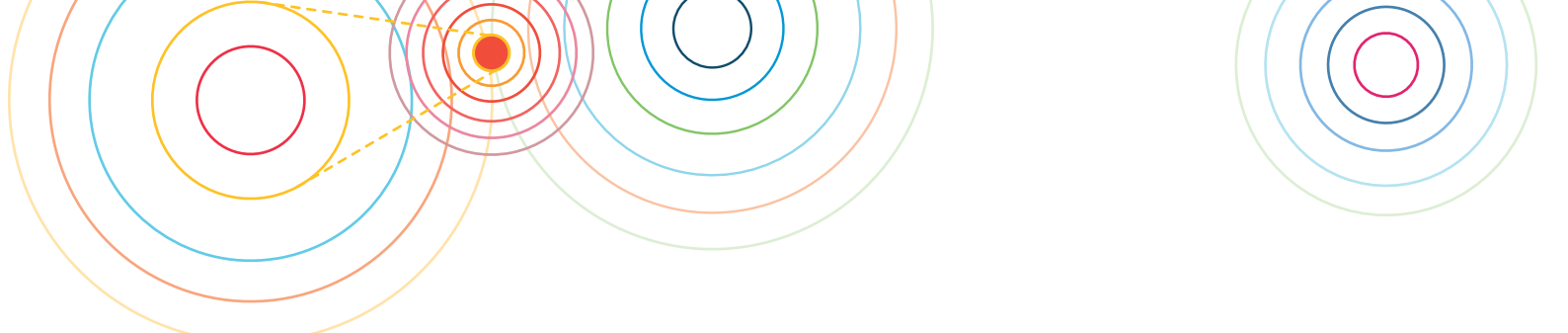
Final reflections

Key policy recommendations that emerged from the CSS project:

1. Continue to support policy initiatives and mechanisms by all levels of government for the Cumberland Conservation Corridor via large-scale initiatives, such as CSS, that recognize the key role played by community engagement and education.
2. Recognize that enhancing ecological connectivity for long-term conservation of the Cumberland Plain Woodland requires an ongoing commitment for weed management, monitoring and maintenance, as well as planting and education.
3. Develop flexible funding mechanisms attuned to the on-ground reality and to different requirements over time and in different places. Ongoing funding that supports weed management and maintenance is just as crucial for biodiversity outcomes as is the provision of plants. New funding arrangements could include more flexibility in devolved funding arrangements for on-ground organizations, as well as including the facility to fund more strategic initiatives to: further targeted research; provide assistance for local leaders and private landholders to develop networks; and direct funding into on-ground priorities.
4. Consider the development of a coherent framework for Western Sydney biodiversity conservation and action (encompassing land and water systems) in order to leverage government priorities across a range of agencies to achieve systemic environmental benefits and biodiversity outcomes. Supporting a viable Cumberland Plain Woodland in Western Sydney requires facilitating the health of the waterways as connectors with the larger terrestrial remnants of woodland and liaising with private and public landholders. This will require a multi-stakeholder approach at all levels of government. For example, there is a scattered range of well-developed resources and opportunities available for the local community and private landholders, but these are not simple to access and are located across multiple agencies. Equally, there is a need to ensure that local communities are educated concerning the impacts of noxious weeds and land clearing and that the requirements concerning these are clearly communicated and complied with at a very local level across all of these communities.

Recommendations for further on-ground action include taking a place-based approach that:

1. Recognizes the institutional potential of schools as places for long-term biodiversity conservation which supports enhanced connectivity. Schools should be supported with teachers' professional development and be given further opportunities to extend their conservation efforts into local places beyond their school grounds to which students can walk. These efforts should be coordinated with Bushcare groups and local councils to undertake environmental restoration for ongoing beneficial environmental outcomes.
2. Upscale the promotion of environmental volunteering opportunities and activities within the corporate sector and expand these to Bushcare and private landholder networks. Consideration should be given to broadening corporate activities to include ground preparation, watering and weeding. This would require further initial work and training, but would provide additional and much needed intensive labour for dealing with weed-infested areas. For large scale environmental restoration in areas with already established Bushcare groups and participating local landholders, there is an opportunity for corporate volunteers to significantly add value to this work. Networking, organization and education would be required at the local level; exemplars already exist in Western Sydney.



Collaboration of institutions to promote biodiversity conservation and sustainability action through education and communication among schools and community of Uttar Pradesh, India

RCE Lucknow, India

Authors: Preeti R. Kanaujia, Neeraj Pal

SDGs to which the work contributes: 14 and 15

Introduction

Biodiversity is usually seen as a technical subject in India when it comes to both the public and the school system. To conserve our rich natural heritage, it is critical that people, especially young children, learn about the importance of biodiversity from the local to the global level. To take the necessary steps to conserve biodiversity and for maintaining the earth's life support system, it is important to have the active participation of all members of society in conservation efforts. The Aichi Biodiversity Target One sets an agenda that – by 2020 at the latest – people are made aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. The SDGs also recognize this need and set targets in order to conserve biodiversity through various measures by 2030.

Education is an essential and sustainable tool for sensitizing the masses and younger generations about biodiversity and its role in the functioning of the world. Usually, the school curriculum covers topics linked to these areas. Unfortunately, this is not always the case in schools in Lucknow, especially in rural areas. Although we are aware that biodiversity and conservation knowledge will inspire more young people to participate in conservation efforts, if this wisdom is not being created through formal school systems, what approach should we take?

Lucknow offers an example of how we engaged with local communities and rural schools by teaching them about local biodiversity. For biodiversity conservation and sustainability, education is an essential element for building values towards attitudinal and behavioural change. The engagement of all stakeholders in a community has a critical role in nurturing and conserving local biodiversity.

Our approach

To promote biodiversity education and awareness, a unique initiative was conceptualized by RCE Lucknow's partners. This initiative was about developing a mobile exhibition bus to generate awareness and understanding among schoolchildren and the area's public – especially women and girls – about biodiversity in the region. The Centre for Environment Education (CEE) conceptualized this initiative with technical and financial support from RCE partners, including the University of Lucknow and the government department of Uttar Pradesh State's Biodiversity Board (UPSBDDB). Other RCE partner institutions provided support in the implementation of the initiative.

A mobile exhibition bus was developed to highlight key information and facts about the region's biodiversity. The mobile bus was named *Prakriti* which means 'nature'. A colourful display was prepared to generate curiosity among visitors about the exhibition. Input from RCE partner organizations and individuals within the RCE helped in finalizing the content and design of the exhibition. Research and studies conducted on biodiversity within the state by both of the RCE partner institutions involved in research were shared, which formed the basis for developing the content of the exhibition. The University of Lucknow shared their field observations and photos for developing content and designing panels. The UPSBDDB provided financial and technical support for developing the exhibition.

The prime geographical operational areas for the *Prakriti* bus were planned to be in both rural and urban locations of Lucknow and its surrounding districts, covering schools, colleges, institutions and other culturally important places. Most of the areas are witnessing rapid urbanization, with a high density of population, large-scale habitat destruction, pollution, invasive species, changing climate and changing life styles – all of which are taking a heavy toll on biodiversity.

Keeping these concerns in mind, a communication strategy for the mobile exhibition was designed. CEE identified and trained a team of science communicators to travel with the exhibition to transact information in an interesting way. The training of the team was focused on various aspects of how and what information will be provided to the designated audience. Interactive games and educational activities were designed for students to be conducted during the visit. To introduce students to the ESD curriculum, teams used local examples that illustrated sustainability, or traditional knowledge, or values related to sustainability. The focus of interaction with visitors was to inculcate a value of respect towards each other and present and future generations, and towards the planet's flora, fauna and other natural resources.

RCE Lucknow's member institutions worked together to plan and execute events in each location the mobile exhibition bus visited. Information was shared with concerned government departments about the arrival of the bus by UPSBDB. School authorities were contacted by CEE to finalize the travel plan of the bus. The first part of the day was typically spent in a given school and evenings were used to reach out to communities. In schools, children of varied age groups visited in groups to the bus and interacted with the biodiversity communicators. Major girls' schools, colleges and women's groups were selected for visits as women and girls in the region, especially those in rural areas, tended to have less access to various means of information on biodiversity. Many in the communications team were women, in order to encourage the participation of girls and women in the schools and communities visited.

Games, competitions, quizzes and activities were used to help children learn more about biodiversity and related issues around them. Apart from these visits, the CEE team also looked at various opportunities for bringing the biodiversity exhibition to the public, such as science fairs, farmer and community fairs and temple and religious events. Youth volunteers from the University of Lucknow facilitated the exhibition display on the university campus and other locations throughout Lucknow.

A set of information, education and communication (IEC) materials, including posters, booklets, charts, pamphlets and a 'save biodiversity pledge' were developed by RCE Lucknow and these were provided to the schools and communities visited. Children, teachers, youth and the general public were guided to work on biodiversity conservation measures at the local and individual levels by using local materials to prepare and install bird feeders and houses and to document the biodiversity around them. Feedback about the exhibition and interaction with visitors was documented along the journey. Based on the feedback, RCE Lucknow developed an eco-chart on Uttar Pradesh's biodiversity in the form of display material highlighting key features of the biodiversity of this northern state.

Teachers stated that the Prakriti bus has inspired and enhanced the understanding of children about the value of biodiversity. It has generated curiosity among the young and encouraged them to ask questions and to seek more information about diversity of flora and fauna. Interactive games helped children to relate what they have learnt. Teachers and students were enthusiastic about this new kind of teaching and learning. Communicators on the bus observed children and community members relate the information displayed on the vehicle with their local environment in terms of the variety of crops, the species found in their own locality, such as in ponds and orchards, correcting myths about some of the animals in their own areas, and the importance of insects in their daily lifestyles.

The visit of the bus to schools was not a mere four to five hour interaction or information dissemination. It left an impression among young visitors which motivates them to take 'hand print' actions for biodiversity conservation in their own schools and within their communities. Connections between the exhibition and daily/real life were starting points for further and deeper engagement with the exhibits. Longer interaction with topics that connect to daily life and are meaningful to the visitors leads to a better understanding of the surrounding world.

A random study was conducted among school students by RCE Lucknow with the aim to assess knowledge gained and to understand any change in attitude specifically towards biodiversity and towards the environment in general. This study was carried out through pre- and post-visit questionnaires, which focused on capturing and analysing the understanding and awareness among the schoolchildren. As a follow-up to the bus visit, students and teachers were encouraged to document the biodiversity of their own school campus and initiate action projects such as arranging bird nests and feeders, planting indigenous plants, or creating a 'biodiversity corner' on campus.

This case study presents an approach adopted by RCE Lucknow that takes biodiversity education to the doorsteps of people, in order to learn about and understand the diversity of life around them. Considering rural area schools and villages had limited access to information and opportunities to learn about biodiversity, the mobile exhibition bus was used as a medium to reach them. This initiative raised awareness and built better understanding of the importance and value of biodiversity. This effort brought together multi-stakeholder collaboration, engaging government, formal education systems, scientific institutions and the media to share their experiences and information on biodiversity with a larger audience. The experience could become a good example for other institutions to use similar approaches towards ESD.

Outcomes

The mobile exhibition was initiated on a pilot basis to see the effectiveness of this strategy in not only creating awareness, but also building an understanding on the importance of biodiversity in our daily life. While interacting with visitors, one could easily gauge that the word 'biodiversity' was not well understood among the people that were reached out to. Once they pass through the entire bus, visitors gain a better understanding of what biodiversity is and how it connects to their daily lives. The mobile exhibition bus was funded for a two-year period (2014 to 2016) by UPSBDB to use mobile exhibitions to generate awareness. During this period, the exhibition travelled around 3,000 km, reaching over 462 schools and colleges, 174 villages, and receiving 296,210 visitors, with 42 per cent of these being women and girls.

Being a mobile exhibition, the bus had wide access to areas where students and communities have not had contact with this type of information. Rural school students, who generally cannot afford to visit a museum, zoo, or exhibition received the opportunity to see this exhibition and to learn about their own state's biodiversity. The remarks made by students, teachers, community members and officials from these remote locations were very encouraging.

Data analysis from the project showed that visits of the bus greatly enhanced the knowledge of students in both urban and rural regions on the topic of biodiversity. Reports submitted by students after the visit of the bus showed their enhanced understanding about local biodiversity and appreciation about the value of diversity of life found in the region. Schools were also linked with other biodiversity and sustainability education-focused initiatives to develop a sense of appreciation and interest in diverse life forms and processes in and around their neighbourhoods.

Final reflections

The Convention on Biological Diversity (CBD) states that a lack of awareness results in less public support for the conservation and sustainable use of biodiversity. This has been also considered in the National Biological Diversity Act (2002) and Rules of India (2004), which gives guidelines to Central and State government for conducting public education to increase awareness with respect to biodiversity.

Education needs to strongly focus on critical thinking, the ability to take positive action and to see a problem in its holistic perspective. The 'Handprint' – launched in 2007 during the fourth International Conference on Environment Education at Ahmedabad, which symbolizes action for sustainability – is a measure today which stands for caring and working together towards a sustainable future.

It is important to give children a positive message about their ability to bring about positive environmental change. Diverse sectors and environmental issues need ESD, but the approaches need to be locally effective and appropriate.

Keeping this in mind, UPSBDB has been conducting awareness and educational programmes in partnership with both formal and non-formal institutions. CEE has been implementing and facilitating educational activities to promote biodiversity conservation which has strengthened their Memorandum of Understanding (MoU) with the CBD.

The University of Lucknow has been implementing various biodiversity education, awareness and research study initiatives with RCE partners focusing on schools, youth and community. By bringing together experiences of all the institutions in RCE Lucknow, this initiative was implemented on a pilot basis to help raise public awareness and include schools to introduce biodiversity education in the curriculum. This experience could be helpful for institutions who are working towards planning and implementing education for sustainability programmes.

There are many mediums to learn about biodiversity such as media, television, internet, books, interpretation centres, museums and the school curriculum. However, the study done during the implementation of this project revealed that not everyone has equal access to each of these sources.

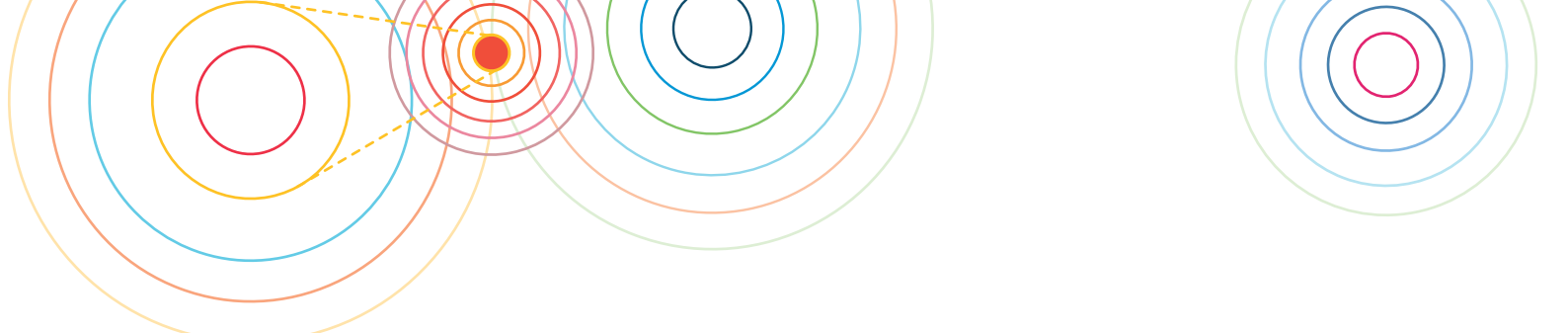
Thus, institutions should collaborate to try out innovative concepts and practices to find platforms that can bring biodiversity education to people and engage stakeholders, particularly children, youth, women and girls and especially those in rural areas.

This initiative is a good example of how varied institutions can collaborate to engage stakeholders from various backgrounds to know about and appreciate the diversity of life. Taking this experience forward, RCE Lucknow's partners are continuing to collaborate to create awareness and understanding among various target groups in the northern state.



Figure 9: A flow of ideas: Students learn about river diversity at a presentation carried out in front of the mobile exhibition bus in Uttar Pradesh state.

(Image credit: © CEE)



Watershed ecosystem investigation for climate change adaptation: A case study for Sirindhorn International Environmental Park and the surrounding area

RCE Cha-am, Thailand

Authors: Sonjai Havanond, Areeporn Sittiyapaiboon

SDGs to which the work contributes: 1, 3, 6, 12, 13, 15 and 17

Introduction

The Sirindhorn International Environmental Park was established as a learning centre on natural resources and environmental conservation. The site is a watershed management area and applies adaptive management of the watershed.

The park has been developed as a demonstration site for the dissemination of knowledge on watershed and coastal management in the face of climate change, which is already impacting the Gulf of Thailand.

Learning activities provided by RCE Cha-am in the park provide knowledge and guidance for people from various sectors to apply in order to solve problems related to erosion, sea-level rises and saltwater intrusion. Furthermore, RCE Cha-am collects data on forestry practices, soil and water quality, climate conditions and socio-economic factors of residents of the area.

This data is then used in designing management and education strategies with the participation of researchers, leaders, stakeholders and other communities. The result of this work is not only useful for the study area, but also for others throughout Thailand.

Our approach

Methodology

The rehabilitation and conservation of natural resources, including watershed areas, requires a basic knowledge on water and soil conservation and on how to apply this knowledge for research conducted to promote the sustainable use and sustainable development of watershed areas.

For the successful management of natural resources within a watershed, there should be integrated management planning through multi-stakeholder participation based on education on both scientific knowledge and local wisdom.

Analysis on multi-stakeholder involvement

RCE Cha-am is composed of representatives from organizations and communities that cooperate for the formulation of action plans around ESD in the watershed. The formulation of this type of action plan can be seen in Figure 10.

For this particular project, the research team that implemented the project was the Sirindhorn International Environmental Park and Kasetsart University. However, data collection and analysis was supported by the Geo-Informatics and Space Technology Development Agency of Thailand, as well as the Land Development Department of the Ministry of Agriculture and Cooperatives in Thailand.

Additional support for analysis was provided by Ramkhamhaeng University and the Hua Hin Meteorological Station. Additional technical support was provided by the Department of Water Resources from the Ministry of Natural Resources and Environment, Thailand, USAID and local community leaders.

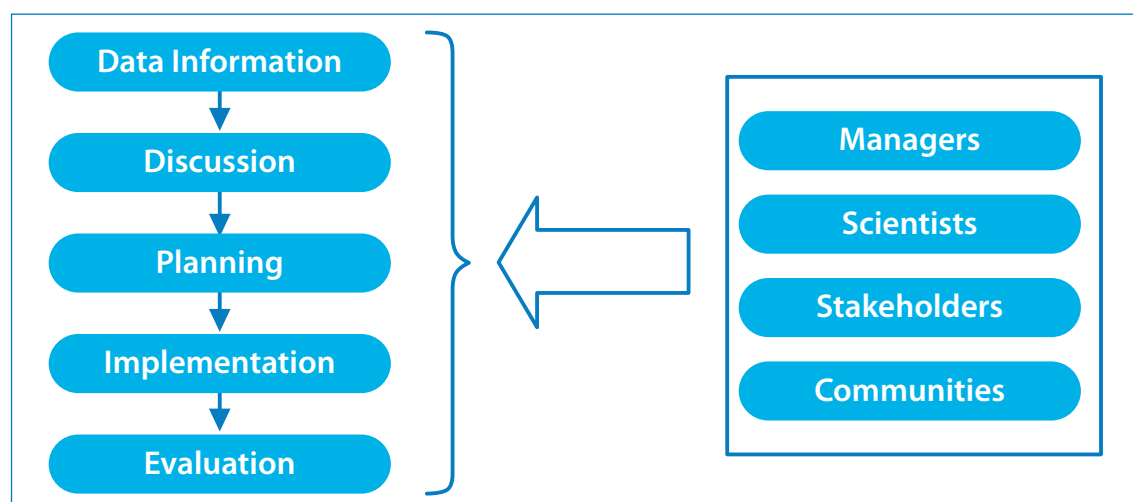


Figure 10: Multi-stakeholder involvement in the formulation of ESD action plans in the watershed

The outcome of any RCE Cha-am project leads to adaptive management that focuses on learning for sustainable development. A project's action plan will be formulated through the participation of managers, scientists and other stakeholders including communities with local knowledge about the area or the topic that the ESD project aims to address.

An ESD project at RCE Cha-am

Research from both the Bangtra Noi and Bangtra Yai watershed areas indicated that 30 per cent of the combined area does not supply enough water for rice paddy fields. However, the combined watershed areas can provide enough water for other agricultural crops that demand less water. Using both local wisdom and worldwide scientific knowledge, vetiver grass (*Chrysopogon zizanioides*) was identified as a species with a high potential to slow down the velocity of water flow in the rainy season and thus increasing the water percolation rate.

Moreover, creating small artificial ponds – known in Thailand as ‘monkey cheeks’ – was identified as a project that can also sustain water supply in the dry season by collecting water during the rainy season. Within the watershed, mangrove areas, beaches and forests have been rehabilitated to adapt to changing climate conditions through people participating in projects using these practices. Water user groups in the watershed areas network and share knowledge on these best practices. Furthermore, they update their information and hold meetings several times a year among themselves and with the governmental sector.

Analysis on learning

Within the watershed area, there are Royal Development projects involved with forest and water conservation from reef to ridge. Huai Sai Royal Development Study Centre, established by King Rama IX, is located in a highly elevated upstream area of the watershed (the ridge). The Sirindhorn International Environmental Park, where RCE Cha-am does its work, is situated in a downstream part of the watershed (the reef). The entire watershed area (from reef to ridge) has a variety of environmental rehabilitation projects to address changing climate, each with an education and capacity-building component.

A common point of reflection on all projects is how watershed management for sustainable development can emerge and be sustained through scientific knowledge and local wisdom, together with multi-stakeholder support and local participation, using the Thai ‘Sufficiency Economy Philosophy (SEP)’. The development of an adaptive management plan is also a significant part of education and learning in the demonstration site, as stakeholders learn from each other about the watershed and apply this knowledge in the formulation of a plan they would later enact.

Outcomes

The watershed management initiative has increased public knowledge on various topics related to climate change in the Gulf of Thailand over a long period of time. This includes land, beach and mangrove rehabilitation, vetiver grass plantations, coastal erosion and

protection, sustainable agriculture, and water catchment management. RCE Cha-am's work with local communities and the Sirindhorn International Environmental Park attracts people from around Thailand and internationally to visit and learn about watershed management in the context of a changing climate. This knowledge can then be applied nationwide and globally in the context of respective watersheds.

As of 2019, over 100,000 people have visited the demonstration site to learn about rehabilitation of natural resources and watershed management through SEP. The coastal wetland reserve in the park is particularly critical for learning about wetland conservation – not only best practices for mangrove afforestation and coastal erosion protection, but also the active conservation of nursery grounds and food sources for marine animals, as well as local and migratory birds. The lessons visitors learn here can be applied to other coastal sites for both coastal wetland ecotourism and increasing income generation in coastal communities without sacrificing wildlife habitats.

Adaptive management is also learned by visitors on the demonstration site as part of the learning process. This can be applied and developed in other areas to help manage watersheds in order to lift people's welfare and living standards, as well as increase their knowledge of conservation practices of natural resources from forests to water supplies. In addition, lessons on adaptive management enhance local participation and multi-stakeholder involvement.

Final reflections

Any watershed is bounded by a water catchment area, usually from an upland area to a coastal area. Therefore, any manager working on ESD in a watershed area should be capable of communicating effectively, thereby creating good public relations with communities and stakeholders throughout the entire water catchment area, even if activities are bound to one watershed. For example, the individual should cooperate well with leaders and other stakeholders in transboundary provinces for planning and effective implementation of any education activities in order to reduce redundancy and upscale impact.

RCE Cha-am's research determined that an area's water supply depends on both forest condition and forest type. Based on this finding, RCE Cha-am recommends that forest type and density should be conserved. Consequently, instruction about these issues is a vital tool in ensuring the preservation of forests, particularly dense woodlands. Factors such as population density and increases of both residents and tourists, as well as the consequence of climate change on a watershed, should be included in education materials.

Within this approach, it is important to include ecologists and natural scientists' expert knowledge into learning content and disseminate it among the local population so they can be an active and effective force in conservation efforts. This will help to increase the resilience of the watershed in general. Continuous evaluation of the environment within the watershed is also important for long-term implementation of any project or programme.



Making Iskandar Malaysia a sustainable and low carbon society

RCE Iskandar, Malaysia

Authors: Fatin Aliah Phang, Boyd Dionysius Joeman, Ho Chin Siong, Jaysuman Pusppanathan

SDGs to which the work contributes: 4 and 13

Introduction

RCE on ESD Iskandar, or RCE Iskandar, was established in November 2014 and officially launched by the Johor State Government on 7 February 2015. It is a network of experts who use education in promoting sustainable development in the region of Iskandar Malaysia, the southern economic corridor of the country, which is administered by the Iskandar Regional Development Authority (IRDA). IRDA and Universiti Teknologi Malaysia (UTM) work together to ensure that the vibrant development of Iskandar can remain sustainable in all three domains of sustainability – economic, social and environmental – using ESD. The Environment Division of IRDA plans and coordinates ESD activities, while the UTM-Low Carbon Asia Research Centre helps IRDA with the planning, policy-making, research and best practices for Iskandar. As a result, RCE Iskandar's actions in ESD are guided by the following regional level policies and plans: 'Low Carbon Society Blueprint for Iskandar Malaysia 2025', 'Iskandar Malaysia: Actions for a Low Carbon Future', and 'Iskandar Malaysia Comprehensive Development Plan II'. RCE Iskandar holds together a network of experts in ESD from different sectors, namely government, community, NGOs and corporations similar to the quadruple helix approach (Gouvea et al., 2013).

Iskandar Malaysia

Iskandar Malaysia is one of the economic regions created by the Malaysian government to spearhead Malaysia's economy to coordinate growth in different regions of the country. As shown in the maps below, Iskandar Malaysia is a southern corridor of economic development located in the southern part of the State of Johor. With a total area of 2,217 km², Iskandar Malaysia covers the districts of Johor Bahru, Pasir Gudang, Kulai and parts of Pontian

(Khazanah Nasional, 2006). IRDA, which was established in February 2007, functions to determine policy, goals and strategy in the region's development, with the vision to create a 'strong and sustainable metropolis of international standing' by 2025.

As shown in Figure 11 Iskandar and the five flagship zones of Iskandar Malaysia (Khazanah Nasional, 2006), five flagship zones were established as the main economic growth centres with their respective niche in Iskandar Malaysia. These flagship zones are envisaged to further strengthen existing economic clusters as well as to diversify and develop targeted growth sectors. The secretariat for RCE Iskandar is located at UTM in Johor Bahru and within Iskandar Malaysia.

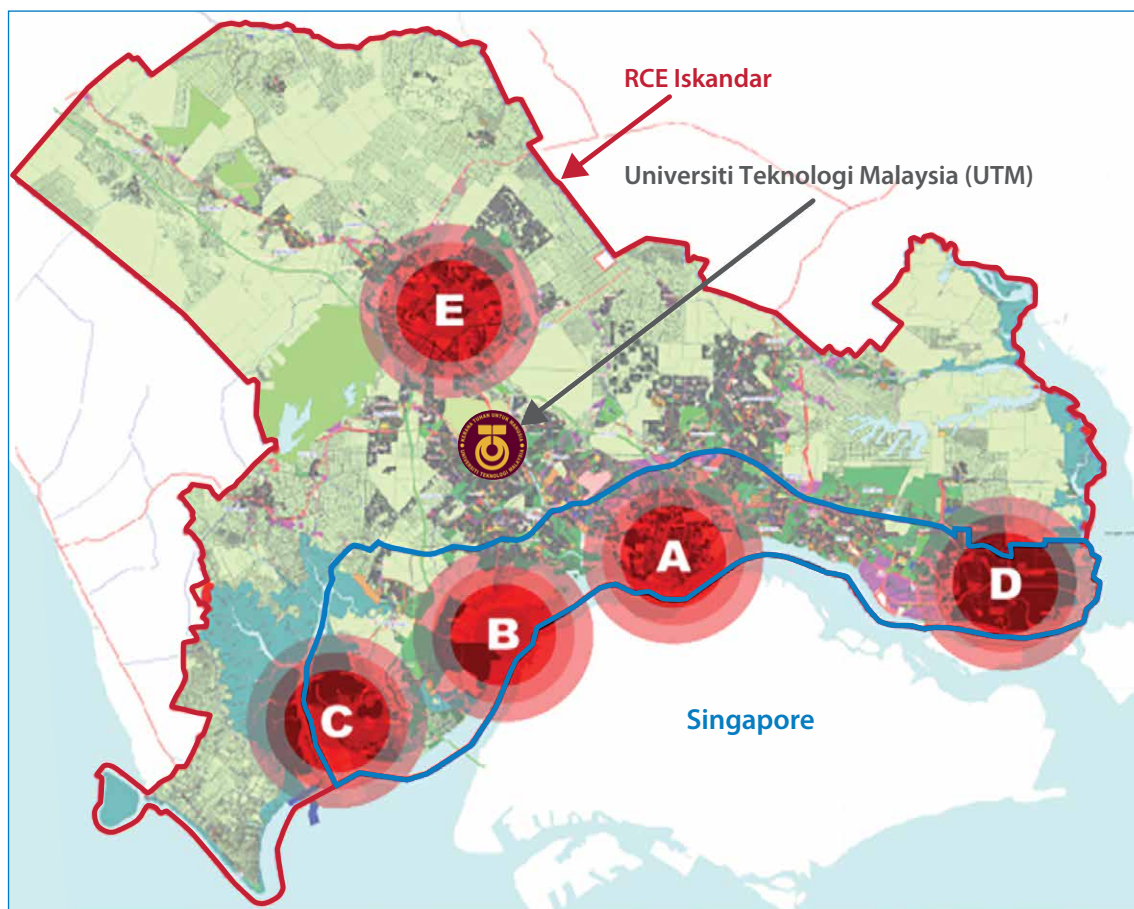


Figure 11: Iskandar and the five flagship zones of Iskandar Malaysia
(Khazanah Nasional, 2006)

In order to prepare a Low Carbon Society (LCS) blueprint to assist in the development of the region, an international research project under the Science and Technology Research Partnership for Sustainable Development (SATREPS), sponsored by the Japan International Cooperation Agency (JICA) and the Japan Science and Technology Agency (JST), was started in 2010. The project combines researchers from Malaysia and Japan to develop policies, programmes and suitable actions to ensure Iskandar achieves a reduction of greenhouse gases compared to business-as-usual scenarios.

Table 4: Projected main socio-economic variables of Iskandar Malaysia according to data of the UTM-Low Carbon Asia Research Centre in 2012

| | 2005 | 2025 | 2025/2005 |
|-------------------------|-------|-------|-----------|
| Population (1000) | 1,353 | 3,000 | 2.22 |
| Household (1000) | 303 | 706 | 2.33 |
| GDP (Bill. RM) | 35.7 | 141.4 | 3.96 |
| Gross output (Bill. RM) | 121.4 | 438.9 | 3.61 |
| Primary industry | 1.5 | 2.4 | 1.59 |
| Secondary industry | 86.2 | 274.0 | 3.18 |
| Tertiary industry | 33.7 | 162.5 | 4.82 |

Regional challenges

Referring to Figure 11 Iskandar and the five flagship zones of Iskandar Malaysia (Khazanah Nasional, 2006) above, it has been projected that the population of Iskandar Malaysia will double from 1.3 million in 2005 to over 3.0 million by 2025. This will be supported by a stable 7–8 per cent annual GDP growth that is primarily driven by services and manufacturing under nine promoted sectors. Iskandar Malaysia experienced very rapid development since its inception due to several factors, notably the completion of the Comprehensive Development Plan 2006–2025 (CDP), the preparation and adoption of twenty-four development blueprints, and the creation of IRDA. Therefore, in line with SDG 13 (Climate Action), a few policy papers were drawn up to ensure that the residents of Iskandar Malaysia are well informed of the problems related to climate change and to raise awareness among them about actions in the region that contribute to climate change.

An increase in population leads to an increase in resource consumption. This will put pressure on the environment, which in turn needs more thoughtful resource management through education, advocating a low carbon lifestyle among the communities in the region. Malaysia's total greenhouse gas (GHG) emissions increased by 45 per cent in 2000 compared to its 1994 levels. In an effort to curb the nation's contribution to climate change, at the 2009 United Nations Climate Change Conference, the former prime minister committed to a 'conditional voluntary reduction of carbon emission intensity per GDP of up to 40 per cent by the year 2020 compared to the 2005 levels'. Table 5 Scenarios on energy demand, GHG emission and intensity in 2005 and 2025 for Iskandar Malaysia (Low Carbon Society Blueprint for Iskandar Malaysia 2025) below represents the scenarios on energy demand, GHG emissions (total and per capita) and intensity in 2005 and 2025 for Iskandar. In a business-as-usual (BaU) scenario, in 2025, the level of GHG emission will increase.

Table 5: Scenarios on energy demand, GHG emission and intensity in 2005 and 2025 for Iskandar Malaysia
(Low Carbon Society Blueprint for Iskandar Malaysia 2025)

| | Unit | 2005 | 2025BaU |
|--------------------------------------|------------|------|---------|
| Final Energy Demand | Mtoe | 2.5 | 7.6 |
| GHG Emissions | MtCo2eq | 11.4 | 31.5 |
| Per capita Co ₂ emissions | tCO2eq | 8.4 | 10.4 |
| GHG Intensity | kgCO2eq/RM | 0.32 | 0.22 |

In response to the national commitment, IRDA took the initiative to take a 'balanced green economy-green community-green environment' growth path in developing Iskandar Malaysia. Through strong policies, IRDA has planned and will manage and develop the economic region's natural resources through close collaboration with all stakeholders, especially local communities whose knowledge and intimate experiences of their environment are critical. In this respect, ESD is the cornerstone to ensure community and grassroots stakeholders are well informed of and stay abreast with the latest in global sustainability and low carbon efforts.

Our approach

ESD and SDGs for RCE Iskandar

Sustainable development is an approach to achieving balance between economic, social, and environmental development (Drexage & Murphy, 2010). Education is an essential tool for achieving sustainability, which calls for giving people knowledge and skills for lifelong learning to help them find new solutions to their environmental, economic and social issues. Sustainable development in Iskandar Malaysia accounts for the direct and indirect needs of all stakeholders. It will enhance the quality of community life without compromising the local environment and ecology. ESD will enable members of a society to implement sustainability plans; to make informed decisions based on objective data and information; and to increase the quality of life by increasing the opportunity for economic and social well-being.

RCE Iskandar aims for the development of an LCS in Iskandar Malaysia. The first working definition of an LCS is to 'take actions that are compatible with the principles of sustainable development, ensuring that the development needs of all groups within society are met' (NIES, 2006).

An LCS targets several of the SDGs and ESD in Iskandar Malaysia by focusing on a number of different sectors of society, namely:

1. **SDG4 – Quality Education** will be achieved by ESD for all educational institutions (schools and universities) through co-curriculum activities in primary and secondary schools, through programmes such as the ‘Ecolife Challenge’ and teacher training, and by embedding the concept of sustainable development in undergraduate courses (e.g. engineering courses at UTM).
2. **SDG11 – Sustainable Cities and Communities** will be achieved by ESD for communities and the general public through Local Agenda 21 programmes and ‘3R’ programmes by government agencies and local authorities working with education campaigns. Public understanding, awareness-raising and involvement will include ESD for rural areas (such as Felda Taib Andak and the Sungai Melayu Eco-Tourism village).
3. **SDG8 – Good Jobs and Economic Growth** specific to a particular job or class of jobs is covered under ESD through job training for industry players and developers, especially among respective leaders (such as Youth Hub and Kawan Iskandar Malaysia [Friends of Iskandar Malaysia]).

Cases for SDG 4: Quality education

With the limited length of this publication, this section will only present four cases of programmes related to ESD pioneered by RCE Iskandar.

Iskandar Malaysia Ecolife Challenge (IMELC)

The Iskandar Malaysia Ecolife Challenge (IMELC) aims to create awareness among primary school students, teachers and their families about achieving the targeted carbon reduction for Iskandar Malaysia by 2025. The IMELC is a student learning activity on LCS that is conducted as part of both formal and informal education in a school setting.

It can also be conducted as a supplementary learning activity or inter-school competition. IMELC was started in 2013 as part of a research project funded by SATREPS. The main parties involved in the project are Kyoto University in Japan, UTM and IRDA in Malaysia. With close collaboration with Jabatan Pendidikan Negeri Johor (State of Johor Education Department [JPNJ]), IMELC 2013 was brought to 23 pilot schools (involving 3,790 students) and expanded to 80 schools (15,623 students) in 2014. In 2015, IMELC was implemented in all 228 primary schools (27,628 students) within Iskandar. It continues every year and in 2018, all 403 primary schools in Johor were involved.

IMELC is divided into three phases. The first phase is to train primary school teachers. JPNJ has instructed all headmasters to appoint one to two teachers as the IMELC coordinator for each school. UTM then trains the teachers by giving them knowledge and awareness on LCS and how to use a workbook designed by UTM to educate students on the topic. An IMELC workbook is then distributed at the end of the training to all the teachers based on

the number of Year Six students in their respective schools. Over the past seven years, over 90 per cent of teachers representing their schools for IMELC have been women.

The second phase is to conduct three modules of IMELC within schools. The first module is for students (in a group of five) to complete the workbook. The workbook includes information on climate change and LCS; a self-check survey on LCS practices; a series of eco-household accounting activities to look at the contribution of carbon emissions from their households; a reflective report of each accounting activity; and other learning activities that are related to both LCS and the primary school science and mathematics curriculum. The schools collect the completed workbooks and submit them to UTM for evaluation.

The second module is for each school to run campaigns to try and reduce the use of electricity and water within the school. Each school must submit their utility bills to UTM before and after IMELC to measure the success of their efforts. The third module is for the school to collect as many recyclable items as they can in a certain designated period. The original receipts of recycling sold to vendors must be submitted as proof.

All three modules in the second phase are then evaluated by RCE Iskandar to determine the fifteen best schools that are eligible to take part in the last phase of the IMELC, which is a final presentation to a distinguished panel of judges. For those selected, the school will send a group of students to present what they have learnt about LCS and what they can do to make Iskandar Malaysia an LCS.

Problem-Based Learning for a Low Carbon Society

With the extremely exam-oriented education system the students are now experiencing, many skills that are needed to excel in life are not explicitly fostered in formal education. Therefore, problem-based learning (PBL) has been introduced to Form Two students by RCE Iskandar as a pilot project funded by JICA from 2016 to 2018.

To tackle climate change, LCS is chosen as the subject matter for the PBL classes, in line with the 'Low Carbon Society Blueprint for Iskandar Malaysia 2025'. Sixty teachers from sciences, mathematics, living skills and English subjects from twelve schools took part in a series of training activities by Low Carbon Education and PBL experts from UTM. The teachers designed the problems for three stages of PBL in one academic year. UTM experts followed up with visits to schools to observe how the teachers conducted the PBL classes.

PBL and learning about LCS is difficult and stressful because much planning and monitoring is needed from teachers while the students must learn by themselves in teams. The students must discuss the issues as a team, prepare learning issues and materials, learn and teach each other, present their learning outcomes, ask questions, explore new knowledge, and manage their learning with the facilitation of the teachers. Students from lower achieving schools showed significant changes in their learning attitude and self-confidence.

Students from higher achieving schools become more independent and could better organize their own learning activities in the classroom. All students became more environmentally-conscious and were able to influence their friends and families to adopt low carbon lifestyles. At the end of the year, the best three teams presented their given problems

and proposed solutions at a public presentation where parents and the public were invited to learn about the problems and solutions to make Iskandar Malaysia more sustainable.

RCE Iskandar Sustainable and Low Carbon Schools Exhibition

Starting in 2015, the RCE Iskandar Malaysia Sustainable and Low Carbon Schools Exhibition is an exhibition and competition designed to provide an opportunity for schools in Iskandar Malaysia to showcase their efforts in creating sustainable and low carbon schools. It also gives recognition for their green efforts and contributions towards developing a sustainable Iskandar by helping to reduce carbon emissions.

The schools exhibit photos of their projects and bring some of the products from their school projects to the exhibition, such as fertilizer from composting, effective microorganism (EM) liquid, EM mud balls, aquaponic plants and fish tanks, urban farming products, innovative sustainable science projects, arts made from recycling materials and fruits grown from fertigation planting techniques.

Parallel to the exhibition, there are also hands-on workshop sessions conducted by experts from various organizations and backgrounds. These workshops aim to provide participants with knowledge and information on green action. The workshops cover topics such as water treatment, low carbon lifestyles, green activities for schools, green projects at home, waste segregation, the '3Rs', planting gardens and crops, wildlife conservation, food waste and many other topics. The experts are affiliated with universities, NGOs, governmental agencies and other individuals who are involved in many green projects across the region. Every year, over 500 visitors attend the exhibitions.

Instilling Low Carbon Awareness to Engineering Students

One of the programmes for higher education initiated by RCE Iskandar is an 'Introduction to Engineering' course taken by first-year chemical engineering undergraduates at UTM. The aim is to instil the concept of ESD into course content. In addition, this course serves to bridge from pre-university education into university life, and provides support for adjusting to learning styles and expectations in tertiary education.

A problem related to sustainability is a key component for the content of this course. Cooperative Problem-Based Learning (CPBL) is implemented to support students to solve these sustainability-related problems. In collaboration with the UTM Centre for Engineering Education (CEE), the problem is designed to gradually challenge students with increasing difficulty, while systematically providing the necessary support to scaffold students' learning as they develop the skills to successfully go through the CPBL process and solve the problem.

The problem is framed as a competition to find engineering solutions for issues related to sustainable development, which are practical and cost-effective for the given society and with which students can identify in their own work as engineering students. Related industries and agencies affiliated with RCE Iskandar are solicited and consulted on the problem to make it realistic. Students are required to propose engineering solutions that help to alleviate the sustainable development challenge.

Additionally, a first-year seminar course is used to support the inclusion of stakeholders by inviting them to give presentations and bring students for related site visits. During the competition, stakeholders are invited from various agencies and industries to evaluate the students' solutions. At the end of the course, students are able to understand sustainable development activities and policies in Malaysia and throughout the world. In addition, they learn to understand how the concept of sustainable development can impact how they behave as engineers, encouraging them to develop important engineering skills. Research by Mohd-Yusof et al. (2016) shows positive behavioural change in this regard among the engineering students who have taken the course.

Outcomes

RCE Iskandar has engaged with a great number of stakeholders in the region to achieve the SDGs through ESD, including schools, departments of education, universities, colleges, governmental agencies, local authorities, private companies, industry groups, NGOs and international partners.

For the Iskandar Malaysia Eco-Life Challenge (IMELC), research by Phang et al. (2016a, 2016b) shows that students' awareness of low carbon behaviour improves after involvement with the IMELC. Before participation in the IMELC, students rarely discussed environmental issues with their families, but after participation, there was a 20 per cent increase in this behaviour. This is in addition to significant behavioural change among the students themselves, which included using less air conditioning, regularly separating waste and recycling items, reusing paper and bringing their own shopping bags to stores.

In the course on 'Problem-Based Learning for a Low Carbon Society', research by Phang et al. (2018) and Nawi et al. (2019) showed that students gained a significant number of skills by the end of the year and that their awareness of low carbon practices was greatly enhanced. After the problem-based learning course, students were more confident in presenting their ideas, asking questions and discussing issues related to LCS. They also worked better in teams by the end of the course and had learned to manage their time more effectively.

After the Sustainable and Low-Carbon Schools exhibition, research by Wong et al. (2017) revealed that visitors gained new knowledge on local low carbon initiatives. Visitors learned how to save electricity and water in their households through talks by experts, as well as samples shown in the school's exhibition. They also learned how to make their own compost from food waste, as well as how to plant native trees and recognize different species of plants and animals native to Johor.

Upon completion of the Low Carbon Awareness course for engineering students, research by Mohd-Yusof et al. (2016) showed positive behavioural change in the engineering students who undertook the course. Before attending the course, students rarely discussed environmental issues with friends or family in relation to their work as engineers or their purchasing power as consumers. However, after the course, the engineering students felt that they could discuss how low carbon design relates to their work with friends and family and

encourage them to buy environmentally-friendly products. In terms of behaviour, the use of water in both their personal lives and proposed designs was greatly reduced, while their use of recycled material and contributions to recycling programmes increased.

The continuing collaboration between the stakeholders helps RCE Iskandar to become a more sustainable region that can continue to strive for better development – economically, socially and environmentally. RCE Iskandar will continue to focus its attention on promoting the SDGs by reaching out to an even wider audience, not only within Iskandar Malaysia, but also throughout Malaysia and beyond.

Final reflections

One of the main challenges faced in conducting the educational programmes is the ‘champions’ attached to the schools and institutions. Schools and institutions are actively engaging and supporting programmes because of the champions, or key persons who are attached at the given school or institution. When the champions retire or transfer to another workplace, some schools and institutions may discontinue or slow down their projects, thereby struggling to sustain momentum. To ensure the sustainability of the programmes and projects, an ESD culture must be instilled among all the students and teachers to make ESD the ‘trademark’ of the schools, not the passion of one individual teacher or staff member.

Therefore, as a consequence of all the ESD programmes in RCE Iskandar, the Johor State Education Department (JPNJ) published a five-year action plan to ensure that ESD is implemented in schools in Johor (Phang 2019). The ‘Johor Education for Sustainable Development Action Plan 2019-2023’ was launched by the Johor State EXCO on Education and Religion, YB Aminolhuda Hassan on the 30th of January, 2019. It has five strategic points to enculture ESD for achieving the SDGs for schools in Johor (JPNJ, 2019). Therefore, it is critical that RCEs include policy-making when they work with school systems in order to ensure sustainability of their vital programmes and projects.

Another issue is diversity of engagement within higher education programmes. As with much of the world, women are rapidly outpacing men in higher education enrolment within Malaysia, with the most recent statistics showing 70 per cent of university students are women. However, while women are out-enrolling and out-performing men in academic studies, they have yet to reach 30 per cent of top management positions in the country’s private sector. Both women and men need to continue to be targeted through informal learning as well as formal.

Funding may be an issue, but as the programmes gain reputation through proper reporting and long-term effects, applying for funding from various agencies can be solved with efforts and support from the collaborating parties. For example in RCE Iskandar, for the IMELC, IRDA has been actively facilitating the funding application.

Some ESD-related programmes face criticism of not being able to quantify the effects and provide evidence-based reports after the programmes. To overcome this, all the programmes planned by RCE Iskandar incorporate a certain measurement for data collection and analysis before and after a project, such as surveys, interviews and observations. Reports and papers

are then produced by the researchers from the programmes to describe the effects of the programmes, such as carbon reporting, awareness surveys and so on (Phang et al., 2018; Phang et al., 2017; Phang et al., 2016; Wong et al., 2017). It is very important to show the return of investment of these programmes through data and evidence. It is recommended that all RCEs ensure research and publication of the results is not neglected.

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