

Tackling Climate Action at the Local Level:

Education for Sustainable Development Projects from the Global RCE Network

Editors:

Philip Vaughter
Nancy Pham



REGIONAL CENTRE OF EXPERTISE
ON EDUCATION FOR
SUSTAINABLE DEVELOPMENT

ACKNOWLEDGED BY



UNITED NATIONS
UNIVERSITY



UNITED NATIONS
UNIVERSITY

UNU-IAS

Institute for the Advanced Study
of Sustainability

SUPPORTED BY:



Ministry of the Environment



This document should be cited as:
Tackling Climate Action at the Local Level: Education for Sustainable Development Projects
from the Global RCE Network
UNU-IAS, Tokyo, Japan, 2021

Editing:
Dr. Philip Vaughtner, Research Fellow, UNU-IAS

Technical editing and coordination:
Nancy Pham, Senior Communications Associate, UNU-IAS

Design and layout:
martinbrombacher.de

© The United Nations University 2021
Published by:
United Nations University, Institute for the Advanced Study of Sustainability (UNU-IAS)
5-53-70, Jingumae, Shibuya
Tokyo 150-8925, Japan

Email: rceservicecentre@unu.edu
Web: www.rcenetwork.org/portal

The designations employed and the presentation of material throughout the publication do not imply the expression of any opinion whatsoever on the part of UNU-IAS concerning the legal status of any country, territory, city or area or of its authorities, or concerning its frontiers or boundaries.

The contributing authors are responsible for the choice and presentation of the facts contained in this document and for the opinions expressed therein, which are not necessarily those of UNU or UNU-IAS and do not commit either the University or the Institute.

Print ISBN: 978-92-808-4648-5
e-ISBN: 978-92-808-4598-3

Table of Contents

Foreword	2
Featured RCE Climate Action Projects	4
Editorial	6

Chapter Asia-Pacific

Let's Tackle Global Warming! Virtual Museum of Science Experience RCE Okayama	16
---	----

Awareness and Education on Climate Change: A Day for Climate RCE Penang	20
---	----

Sub-National Actions for Climate Resilient Sustainable Development in Punjab, India RCE Chandigarh	24
--	----

Chapter Africa

Solid Waste Management Options for Food Security, Energy & Climate Change Mitigation RCE North Rift	30
---	----

Managing Biodiversity in a Changing Climate in the Albertine Rift Countries RCE Dar es Salaam	34
---	----

Stakeholder Engagement for Promoting Community Resilience to Climate Change RCE Greater Eastern Uganda	38
--	----

Chapter Europe

Territorial Responsible Research and Innovation Fostering Innovative Climate Action: The Belarusian Experience RCE Belarus	44
--	----

Integrating SDGs in the MSc for Climate Change, Sustainable Agriculture, and Food Security (CCSAFS) Program RCE Crete	48
---	----

Vocational Training in Wood as an Element of Sustainable Construction Methods RCE Denmark	52
---	----

Chapter Americas

How Urban Youth Can Be an Engine to Achieve Low-Carbon Sustainable Lifestyles: Beginning in Bogota RCE Bogota	58
---	----

Landslide Risk Assessment in St. Vincent and the Grenadines RCE Grand Rapids	62
--	----

The Girasoles Project RCE Greater Atlanta	66
---	----

Next Steps	70
List of Abbreviations	74
GAP Priority Action Areas	74
References	75
Authors	77

Climate Education

The solutions to climate change impacts also provide the paths to a safer, healthier, cleaner and more just future for all. However, for such a future to become a reality, citizens in all countries, across all sectors of government, society and enterprise, need to understand the urgency and get involved. Recognising this, national governments around the world have agreed to increase their efforts to educate, empower and engage all stakeholders to find and implement solutions for climate change (UNESCO and UNFCCC 2016, 2).

Known collectively as Action for Climate Empowerment (ACE), Article 6 of the United Nations Framework Convention on Climate Change (UNFCCC) and Article 12 of the Paris Agreement encourage people to take the lead and cooperate in climate change education, training, public awareness, public participation, public access to information and international cooperation in these matters, with youth as a cross-cutting focus. Among others, climate education, and more broadly Education for Sustainable Development (ESD), can empower learners to transform themselves and their societies by developing knowledge, skills, attitudes, competencies and values required for addressing the climate crisis.

Over the last three decades, many governments and other stakeholders have been carrying out various impactful and innovative climate change educational initiatives. To accelerate progress, governments and non-State actors can enhance action, including when designing and implementing climate policies such as nationally determined contributions (NDCs) under the Paris Agreement, by for example (UNESCO 2020, 6):

- promoting, facilitating, developing and implementing formal, non-formal and informal climate education programmes that encourage climate-friendly behaviour, focusing on both mitigation and adaptation;
- including climate change at all levels and across disciplines in both school and higher education curricula, as well as in technical and vocational education and training (TVET) and adult education, targeting the entire population;
- developing pedagogical resources/materials that take into account different knowledge systems, including indigenous knowledge, as well as local languages; and
- implementing quality pre-service and in-service teacher training focused on climate change.



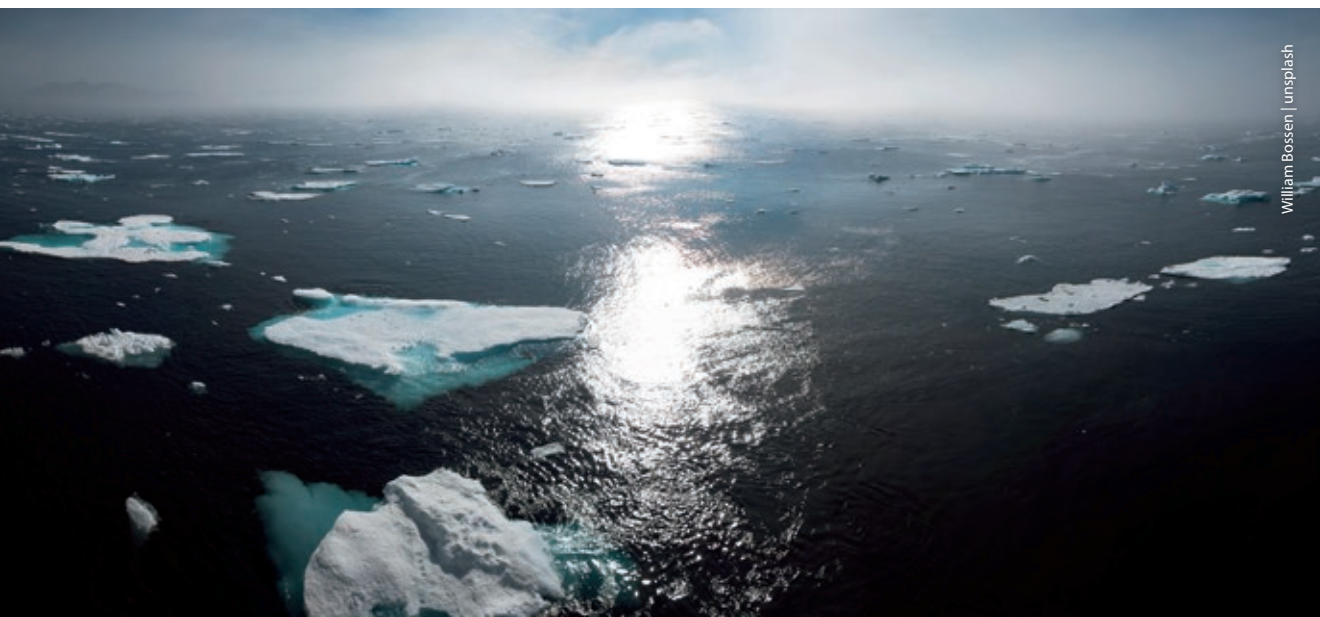
Xochitl Quezall Fonseca/CIMMYT.

ACE also emphasises the need to foster subregional, regional, sectoral and international cooperation in undertaking activities within the scope of ACE to enhance the collective ability of governments and other stakeholders to implement the Convention and the Paris Agreement. All actors are also encouraged to document and share knowledge regarding experiences, lessons learned, good practices, challenges and recommendations for implementing ACE, as well as to promote peer-learning (*ibid.*, 9).

We live in a time when those that are born today will spend their entire lives in a world that is already

1-degree Celsius warmer than is safe for all. Climate education, along with training, public awareness, and access to information, is foundational in securing inclusive and informed participation, and ensuring that the generations entering a labour market shaped by low-emission, climate-resilient societies have the knowledge and skills to thrive.

Ms. Fleur Newman and Mr. Hyunjin Chang
Action for Climate Empowerment (ACE) Team,
United Nations Framework Convention
on Climate Change (UNFCCC)
February 2021



William Bossen | unsplash

Featured RCE Climate Action Projects

A Regional Centre of Expertise (RCE) is a network of existing formal, non-formal and informal organisations that facilitate education for sustainable development (ESD) in local and regional communities. RCEs bring together institutions at the regional/local level to jointly promote ESD. They aspire to use education as a mechanism to translate global objectives for sustainable development into the context of the local communities in which they operate.

RCEs build innovative platforms to share information and experiences and to promote dialogue among regional/local stakeholders through partnerships for sustainable development. An RCE can involve local school systems, higher education institutions, environmental NGOs, museums, zoos, botanical gardens, local governments, local enterprises, volunteer groups, media, civic associations and/or individuals who work in the spheres of sustainable development such as economic growth, social development, and environmental protection.



RCEs Worldwide

As of December 2020, 179 RCEs have officially been acknowledged by the United Nations University worldwide.

Africa & Middle East

- Cameroon:**
 - Buea
- Egypt:**
 - Cairo
- Eswatini:**
 - Eswatini
- Ghana:**
 - Ghana
- Jordan:**
 - Jordan
- Kenya:**
 - Central Kenya
 - Greater Nairobi
 - Greater Pwani
 - Kakamega-Western Kenya
 - Mau Ecosystem Complex
 - Mount Kenya
 - North Rift
- Lesotho:**
 - Lesotho
- Malawi:**
 - Zomba
- Mozambique:**
 - Maputo
- Namibia:**
 - Khomas-Erongo
- Nigeria:**
 - Greater Yenagosa
 - Ilorin
 - Kano
 - Lagos
 - Minna
 - Ogun
 - Port Harcourt
 - Zaria
- Senegal:**
 - Senegal
- South Africa:**
 - Gauteng
 - KwaZulu-Natal
 - Makana and Rural Eastern Cape
- Tanzania:**
 - Dar es Salaam
- Uganda:**
 - Greater Eastern Uganda
 - Greater Kampala
 - Greater Masaka
 - Greater Mbarara
- Zambia:**
 - Lusaka
- Zimbabwe:**
 - Harare
 - Mutare

Europe

- Albania:**
 - Middle Albania
- Austria:**
 - Graz-Styria
 - Vienna
- Belarus:**
 - Belarus
- Czech Republic:**
 - Czechia
- Denmark:**
 - Denmark
- Finland:**
 - Helsinki Metropolitan
- France:**
 - Bordeaux Aquitaine
 - Brittany
 - Paris Seine
- Germany:**
 - Hamburg
 - Munich
 - Nuremberg
 - Oldenburger Münsterland
 - Ostwürttemberg
- Ruhr:**
 - Southern Black Forest
- Stettiner Haff**
- Greece:**
 - Central Macedonia
 - Crete
- Ireland:**
 - Dublin
- Italy:**
 - Euroregion Tyrol
- Lithuania:**
 - Vilnius
- Netherlands:**
 - Fryslân
- Poland:**
 - Warsaw Metropolitan
- Portugal:**
 - Açores
 - Creias-Oeste
 - Porto Metropolitan Area
- Regional:**
 - Rhine Meuse
- Russia:**
 - Nizhny Novgorod
- Samara**
- Serbia:**
 - Vojvodina
- Spain:**
 - Galicia
- Sweden:**
 - North Sweden
 - Skane
 - Uppsala-Gotland
 - West Sweden
- United Kingdom:**
 - East Midlands
 - Greater Manchester
 - London
 - North East
 - Scotland
 - Severn
 - Wales
 - Yorkshire & Humberside

The Americas

- Argentina:**
 - Chaco
 - Cuenca del Plata
- Brazil:**
 - Curitiba-Parana
 - Rio de Janeiro
 - Sao Paulo
- Canada:**
 - British Columbia
 - Greater Sudbury
 - Mauricie/Centre-du-Quebec
 - Peel
 - Peterborough-Kawartha-Haliburton
 - Saskatchewan
 - Tantramar
- Colombia:**
 - Bogota
- Guatemala:**
 - Guatemala
- Mexico:**
 - Borderlands
 - Mexico-USA
 - Western Jalisco
- Peru:**
 - Lima-Callao
- Puerto Rico:**
 - Puerto Rico
- United States of America:**
 - Georgetown
 - Grand Rapids
 - Greater Atlanta
 - Greater Burlington
 - Greater Phoenix
 - Greater Portland
 - North Texas
 - Salisbury
 - Shenandoah Valley
- Venezuela:**
 - Gran Caracas

Asia-Pacific

- Australia:**
 - Gippsland
 - Greater Western Sydney
 - Murray-Darling
 - Tasmania
 - Western Australia
- Bangladesh:**
 - Greater Dhaka
 - Sundarbans
- Cambodia:**
 - Greater Phnom Penh
- China:**
 - Anji
 - Beijing
 - Greater Shangri-la
 - Hangzhou
 - Hohhot
 - Kunming
 - Qingdao
 - Tianjin
- India:**
 - Bengaluru
 - Chandigarh
 - Chennai
 - Delhi
 - East Arunachal Pradesh
 - Goa
 - Guwahati
 - Jammu
 - Kodagu
 - Kozhikode
 - Lucknow
 - Mumbai
 - Pune
 - Srinagar
 - Thiruvananthapuram
- Indonesia:**
 - Bogor
 - East Kalimantan
 - Yogyakarta
- Japan:**
 - Chubu
 - Greater Sendai
 - Hokkaido Central
 - Hyogo-Kobe
 - Kitakyushu
 - Okayama
 - Omuta
 - Yokohama
- Kyrgyzstan:**
 - Kyrgyzstan
- Malaysia:**
 - Central Semenanjung
 - Greater Gombak
 - Iskandar
 - Kuching
 - Melaka
 - Penang
- New Zealand:**
 - Otago
 - Waikato
- Philippines:**
 - Bohol
 - Cebu
 - Ilocos
 - Northern Mindanao
 - Regional:
 - Pacific Island Countries
- Republic of Korea:**
 - Changwon
 - Dobong-gu
 - Incheon
 - Inje
 - Tongyeong
 - Ulju
- Thailand:**
 - Cha-am
 - Maha Sarakham
 - Sakon Nakhon
 - Trang
- Vietnam:**
 - Southern Vietnam



Annie Spratt | unsplash

Editorial

Innovating for Action: Addressing Climate Change through Education

Dr. Philip Vaughter, Research Fellow, UNU-IAS

Climate change is a complex problem. The anthropogenic greenhouse gas emissions that are driving climate change are produced through a huge variety of human activities, including electricity generation, transit, and land use change. Unlike the depletion of ozone layer that was driven by the emissions in a few specialised industries and addressed through the implementation of the Montreal Protocol, the emissions causing climate change span nearly all modern societies' enterprises. Indeed, many of these activities are so embedded within the structures of human societies around the world, it is hard to imagine what our societies would look like without them. Not only do a variety of activities contribute to the anthropogenic greenhouse effect, but each of these given activities has a number of proposed ways to mitigate their emissions. For those willing to look beyond the structural forces that embed greenhouse gas emissions into the daily lives of billions of people around the world, the number of proposed mitigation measures can lead to analysis paralysis – a situation where decision-making becomes paralysed and no course of action is decided on. With so many causes to a given problem, and in turn so many

proposed solutions, however are we to decide which ones are the most effective for us to take?

With an environmental crisis as global in nature as climate change, it might be tempting to lean into a narrative that offers a blanket set of simple and de-contextualised solutions to the problem across the world. However, to do so underestimates the complexity of the Earth's climate system and our own impacts on it. Planting trees is a great strategy to lock in carbon when done in landscapes that were once woodlands. However, this might lead to more carbon emissions being emitted if done in coastal wetlands, which can be more efficient at locking in carbon if conserved in their natural state (Rogers *et al.* 2019). Avoiding air travel is another often touted option for mitigating greenhouse gas emission, but this solution becomes meaningless if an individual emits more in a shift to car transit. And reducing households' energy consumption is a great first step, but may matter little if cities and communities are designed in such a way that transit makes up the bulk of the average person's carbon footprint. The realm of adaptation to climate change is just as contextualised, with urban communities in temperate zones facing an array

of adaptation options that would be completely different than nomadic communities in arid zones. After all, adapting to higher temperatures may be a secondary priority if freshwater becomes scarce. This is not to say that solutions are out of our reach – indeed, many potential solutions are at our fingertips. However, it does mean that solutions to climate change may be more complex and contextualised than we are used to thinking about when it comes to problem-solving.

As with many challenges, education can hold the key for finding solutions to a problem such as climate change. Indeed, education has been such an integral part in proposing solutions to climate change that it has been a key component of the United Nations Framework Convention on Climate Change (UNFCCC) since the Convention's founding. Action for Climate Empowerment (ACE) is the term utilised by the UNFCCC to refer to the overarching goal of empowering all people to engage with climate action via education, training, public awareness, public participation, public access to information, and international cooperation (UNFCCC *n.d.*). Through this platform of ACE, the UNFCCC works with member states of the United Nations on dialogues to promote and exchange good practices related to education for climate action, workshops to build and strengthen the capacities of educators and education policy makers that need to implement education and training in relation to climate change, and negotiations to foster the implementation of climate education and training policies that generate tangible impacts in responding to climate change. Indeed, ACE is seen as so critical to the success of any climate treaty that many member states to the United Nations have designated a National Focal Point for ACE, who is charged with implementing all of the components of the ACE platform at the national level. While creating national policies on climate education is an important first step in climate action, it is the local implementation of these policies that translates

good intentions into concrete results. And while national action plans can create guidelines for effective education to mitigate and adapt to climate change, as previously discussed, the great diversity of causes (from a variety of emissions sources) and effects (including more intense storms and more severe droughts) of a changing climate means that any 'one-size-fits-all' approach may not be best suited for every city, sector, nor community within a given national context.

So how are we meant to go about finding which solutions to climate change are the most effective for ourselves, our households, our workplaces, and our communities? Educating ourselves and each other is a critical component, but how can we tailor education and training to our lived realities in order to make the biggest impact in addressing climate change? What is offered in the following pages is a glimpse of how we might do just that, using the Regional Centre of Expertise (RCE) model on Education for Sustainable Development (ESD) in responding to the unfolding climate crisis.

RCEs are multi-stakeholder networks of formal education and non-formal education organisations that work together to create an integrated agenda on using education as a mechanism for achieving sustainable development in a given city or region. Composed of universities, formal school systems, local governments, NGOs, museums, zoos, parks, and private sector partners, RCEs utilise education and training as a means for communities as a whole to respond to sustainable development challenges in their given area. Through their acknowledgement by the United Nations University – Institute for the Advanced Study of Sustainability (UNU-IAS), RCEs are a critical component in using education and training as a means to translate global goals into local actions on sustainable development. Linking global aspirations to local implementation has been a driving force for RCEs since their inception in 2005, and at the time of this publication, over 170 RCEs exist around the world, working on a variety of



Aaron Katz | unsplash



Francesco Ungaro / unsplash

topics within the field of sustainable development. While RCEs work across a wide range of sustainable development challenges, climate change has been an especially salient topic for this network of educators around the globe. Since the launch of the United Nations' Sustainable Development Goals (SDGs) in 2015 and during the Global Action Programme (GAP) on ESD led by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) between 2015 and 2019, RCEs created and implemented more projects around Climate Action (Goal 13) than any other of the SDGs.

The reasons for this focus on climate change education and action within the RCE community are as diverse as the causes and effects of climate change themselves. Many RCEs during the first five years of the SDGs (2015 to 2019) began to create curriculum linking climate change to a number of other issues within the sustainable development agenda, including other SDGs. While before 2015 climate change education projects among RCEs were more siloed from other sustainable development challenges, at the advent of Agenda 2030 and the launch of the SDGs, intersections between climate change and other sustainable development challenges become more manifest in the education projects addressing climate change. The links between climate action and food security and nutrition (Goal 2 – Zero Hunger) became a predominant theme within West African and Southern European RCEs' climate education projects during this time, with many RCEs from these regions reporting unstable weather patterns making food supply chains more perilous, indicating a growing need for education and innovation around local food sources in relation to climate. Climate Action and its links to Clean Water and Sanitation (Goal 6) are prevalent in many of the RCE projects conducted in India during the same time period, with many RCEs within the country designing numerous education modules on how to train citizens to conserve water effectively during droughts and sanitise water during flood events.

On the other hand, climate change education projects emanating out of East African RCEs during this time tend to focus on the interconnectedness between climate change and biodiversity conservation (Goal 15 – Life on Land), with many RCE projects from the region stressing the need to consider safeguarding native forests and wildlife habitats while responding to climate change.

The means and motivations for why RCEs have utilised education as a means for addressing climate change are diverse, however, the projects showcased in this publication tend to share some important characteristics in common to their approach to education on climate change.

For one thing, many of the RCE projects featured here were careful to create education programmes that took into account where greenhouse gas emissions in their given communities were being emitted from. Often times, curriculum and other educational resources created using a top-down, 'one-size-fits-all' approach to mitigating climate change fail to take into account that different countries, cities, and communities throughout the world can have radically different emissions profiles. This can result in a top-down approach not making as much of an impact in reducing greenhouse gas emissions in a given local setting compared to a climate action plan that can be tailored to have a localised approach that takes local sources (and sinks) into consideration for greenhouse gas mitigation measures. Because RCEs include both universities that carry out research within given localities, local governments that are often responsible for tracking and reporting on issues such as waste, energy use, and zoning, as well as civil society organisations connected to many different communities within their region, they are ideally positioned to know where their local emissions are coming from. Because RCEs are able to identify the primary sources for their given region's emissions, they are also ideally positioned to create or tailor education and

training programmes on reducing these types of emissions. This kind of localised educational approach to stem greenhouse gases can be seen in RCE North Rift's project addressing waste emissions, which made up the bulk of emissions in a rural community. It is also seen in the ground-up approach taken by RCE Belarus in carefully identifying and mapping where emissions were coming from in the Minsk metropolitan area so as to design actions to target the largest emission sources. This approach to localising education and public awareness around local sources for greenhouse gas emissions can also be synergised with national or sub-national climate education policies. Often times climate education policies emanating from a higher level of government can be implemented through successful localisation in curriculum and training, as shown in the projects from RCE Bogota which works closely with Colombia's Ministry of the Environment and RCE Chandigarh which works closely with the Climate Change Knowledge Centre of Punjab State in India.

Also, many of the RCE projects featured here take note of which communities or ecosystems within their region were especially vulnerable to the effects of climate change. The effects of climate change can play out very differently across different ecosystems, sectors of the economy, or communities of people. Safeguarding against disasters caused by climate change often means careful risk assessment as to what as well as who in a region may be especially vulnerable. Here again, RCEs' connections to local researchers, government, and civil society organisations are a strength in reducing risk on the ground. Through their expertise, RCEs are able to translate the specific risks to their region from global climate change, and in so doing can educate local public, private, and civil sectors on how to adapt to and minimise these types of risks. Examples of this type of local risk assessment built into climate education programmes are manifest in both RCE Greater Eastern Uganda's and

RCE Dar es Salaam's projects. Both of these RCEs were faced with communities that were heavily dependent on adjacent forest ecosystems, and the realisation that these forests were already experiencing stresses due to impacts from climate change. Through a combination of conservation training and training in new livelihoods, both RCEs were able to teach the surrounding communities to better safeguard the local forest, resulting in workforces more resilient to shocks from supply shortages as well as a forest better able to store carbon – a win-win for adaptation and mitigation. RCE Greater Atlanta builds its project not around assessing vulnerability in a local ecosystem, but rather in a local labour force, in this case agricultural workers. While agricultural workers are vital to the world's food supply chain, the sector is often informal with limited educational outreach on how workers should protect themselves in a hotter and more humid climate. The educational intervention designed attempts to fill this gap by providing training on how the work force must adapt to protect worker's safety. An especially encouraging aspect of localised vulnerability assessments built into these ESD projects is that they can be geared towards helping not only one's own community, but to help other communities as well. RCE Grand Rapids took their own experience and expertise in working with land slide modeling and worked with a community in Saint Vincent and the Grenadines to assess risk and vulnerability within their own region. Similarly, RCE Crete took its own experience in developing agricultural extension services on diversifying crops and conserving water in a drought prone environment to assist communities in Egypt and Jordan facing these same challenges.

Additionally, the RCE projects within this publication are designed to reach audiences through both formal and non-formal education modalities. While creating an integrated ESD programme across both formal school systems and non-formal community education and workforce

training programmes is a core element of all RCEs, it is especially relevant for projects dealing with the issue of climate change where youth are a critical audience, but not a driving force of emissions. While many of the RCE projects featured here get their start in school curriculums, students in school systems are never the final target audience. Rather, youth within schools are empowered to act as educators to the general public, and go on to educate about the realities of climate change in addition to effective mitigation and adaptation measures that can be taken within a community. The climate education projects from RCE Okayama and RCE Penang may start in classrooms, but they do not end there. Rather, school students are the first recipient of an educator's intervention to teach about climate change mitigation, but these students then themselves teach the surrounding community, either through online websites as with RCE Okayama, or through in-person symposiums as with RCE Penang. RCE Denmark's end goal is not to simply create students who can ace a final construction project for graduation, but to create change within the workforce training programmes of the country's building industry by having a workforce educated in school to de-carbonise the building industry once they are in the workforce. This linking of formal and non-formal education throughout these projects is critical for not only bridging different sectors of society, but different generations within society. In a world where there is an ever-growing number of years lived by most of us after graduation from a formal school system, it is becoming increasingly necessary to realise that learning does not stop when we leave the classroom, especially as we learn more about how our lives impact the world around us.

The projects presented here on climate change education are not a definitive listing of all of the work done by RCEs on the topic of climate change. Nor are they a definitive listing of the modalities that climate change education can take. Rather,

these cases are the starting point for a conversation – one that all of us must start having within our own communities and societies. This conversation will need to involve systemic thinking, critical reflection, and careful planning on how we can each move forward on taking effective action to respond to climate change in order for all of us to move forward with addressing the climate crisis. Education can help inform and empower us about which actions are the most meaningful for us to take within our given context as citizens. However, action competence and actions themselves are the most critical outcomes from any educational endeavour.

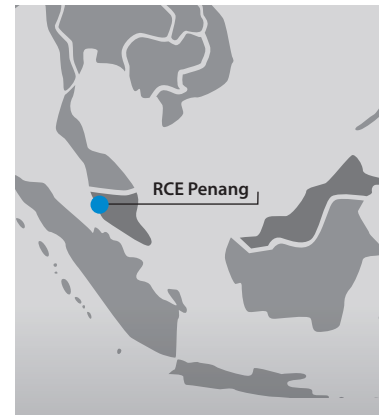
It is this need for education to link to meaningful actions in response to climate change that unifies all of the RCE projects presented in this publication. Rather than setting the boundary for education as sharing knowledge, the educators from these projects emphasise actions – whether to mitigate or adapt to climate change – as the desired goals of these curriculums. Facing the realities of a changing climate requires a lot out of human societies, including knowledge, perseverance, resilience, and hope. But as climate activist Greta Thunberg states, we need action, not only mental fortitude, to respond to climate change – “Instead of looking for hope, look for action. Then, and only then, hope will come” (*Thunberg 2018*). The projects presented here are to serve as a starting place for educators, policy-makers, and communities to begin creating and implementing their own actions to respond to the climate crisis through education. While the contexts and challenges faced by the RCEs are varied, each presents an insight into how educators can innovate for action within a localised context to address climate change. This set of stories will educate and inspire, but most importantly, it will encourage the reader to take informed action on addressing climate change.



Chapter Asia-Pacific



**Let's Tackle Global Warming!
Virtual Museum of Science Experience**
RCE Okayama 16



**Awareness and Education on
Climate Change: A Day for Climate**
RCE Penang 20



**Sub-National Actions for Climate
Resilient Sustainable Development
in Punjab, India**
RCE Chandigarh 24



the learning material helps participants understand the complex global issue of climate change through real-time much easier than via conventional lectures. While students still take lectures online, the learning environment allows for more interaction between participants and the lecturer, and VR or virtual spaces allow students to cultivate a better understanding of climate change using their avatars and smartphones.

CO₂ measuring equipment was set up in some areas of Japan, including Okayama, as well as abroad, to monitor CO₂ concentration and reports from this equipment has been opened to the public in real-time. Under the guidance of local university students, participants shared what they found from the CO₂ concentration dynamics, and learned the reasons for CO₂ sources, sinks, and movement.

Results

In a questionnaire distributed to participants, the students revealed they had a deepened sense of ownership in addressing climate change issues, as well as an increased understanding of climate science and IT. Furthermore, RCE Okayama encouraged students who participated in the project to conduct their own research on CO₂ emissions. Their research won four prizes for scientific research at a contest at the University of Tsukuba (*Ka and Inada 2014*), and the results have been exhibited at the science museum in Okayama City to help visitors understand and reaffirm the importance of global warming countermeasures. RCE Okayama are applying the knowledge and experience of the project to complete a learning program for global warming using scientific data and IT, and aim to expand this program at home and abroad.

Prize ceremony of a research contest at the University of Tsukuba.



Tips to Tackle Climate Action

What You Can Do:

Real-time scientific data can be utilised as a learning material for participants. Specifically, RCE Okayama mostly use the graphs of CO₂ concentrations in their project across different places.

They place CO₂ sensors to monitor the dynamics in each spot, and the collected data gives students opportunities via IT to consider the reason for the change of CO₂ concentrations and how our lives or natural processes such as photosynthesis contribute to these changes.

Why It Matters:

The material enables participants to recognise the effects that their own way of lives/ human activities have on global warming and encourages participants to raise awareness and change their behaviour in their daily lives. Not only that, their actions can influence their family, classmates, or even local communities.

In addition, scientific thinking using data improves students' problem-solving skills and helps participants to become better practitioners for ESD.




As mentioned earlier, some of the participants have done their own research related to climate change. The learning material should arouse their interests in science and global issues, including climate change.

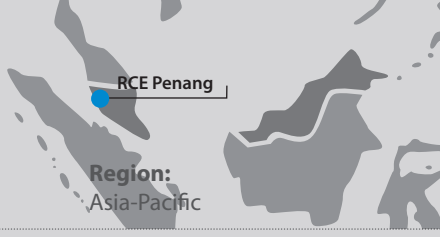
Who to Involve:

The following stakeholders might greatly contribute towards achieving success in this type of project:

- University students can join the project as practitioners. The participants communicate with them and subsequently learn from them and become practitioners of ESD in the future.
- Scientific experts can improve the learning material and give the participants opportunities to learn something specific and sophisticated as lecturers or advisors.
- Coordinators, who engage in activities to mitigate climate change, such as an NGO or NPO, can manage the project, oversee the situation, and plan what to do next.
- Organisations can provide a venue to host the lectures, which is essential. Sometimes a local science museum can do this, or sometimes a school can fill this function. They will also play an important role in advertising the project, encouraging students to join, and disseminating information to the general public.

More Information:

-  ESD Okayama Award 2018: Encouragement Award Winning Project – Activity Introduction of Non-Profit Organisation co2sos
-  Current Status Survey in Republic of Palau for the Purpose of Introducing Environmental Learning to Private Hotels
-  Current Status Survey in Republic of Palau for the Purpose of Introducing Environmental Learning to Private Hotels (Follow-up Report)



RCE Penang

Region:
Asia-Pacific

Country:
Malaysia

SDG(s):
7 Affordable and Clean Energy,
13 Responsible Consumption and Production, Climate Action,
15 Life Below Water, Life on Land, Partnerships for the Goals

Theme(s):
Agriculture, Forests/Trees, Plants and Animals, Waste

Target audience(s):
Primary, Secondary, Higher Education, Teacher Education, Community, Youth (Informal)

Ecosystem(s):
Agricultural, Coastal, Forest, Fresh Water, Urban/Peri-Urban, Wetlands

GAP Priority Action Area(s):
4, 5

Language(s) of project:
English

Contributing organisation(s):

- RCE Penang
- RCE Sejahtera Youth (RSY)
- Seberang Perai Municipal Council (MPSP)
- Penang Green Council (PGC)
- Consumers Association of Penang (CAP)
- Third World Network (TWN)
- Bike Commute
- The Artist Network
- Malaysian Primatological Society (MPS)
- Pesticide Action Network Asia-Pacific (PAN-AP)
- Bakau Hijau – Merbok
- Pertubuhan Alam Sekitar Sejahtera Malaysia (GRASS)
- Green Animal Shelter and Society
- Sahabat Alam Malaysia (SAM)
- Gibbon Conservation Society (GCS)
- Laman Karya Lumut
- Persatuan Aktivis Sahabat Alam (KUASA)
- Suara Rakyat Malaysia (SUARAM)
- Pop & Chee Urban Education
- World Wildlife Fund (WWF)
- Klimate Action Malaysia (KAMY)
- Klimate Action Utara Malaysia (KAUM)

Year submitted/completed:
2019



University students and the public attend the docu-movie screening together.

Chapter Asia-Pacific

Awareness and Education on Climate Change: A Day for Climate

RCE Penang



Situation

RCE Penang’s secretariat Universiti Sains Malaysia (USM) conceptualised the University in a Garden concept in 2001 to depict the close affinity between the role and function of a university as an institution of higher learning and as part of nature in a global ecological setting. The flora, fauna, aquatic elements, and other natural elements are dynamically linked to the exploration of knowledge on the campus. The concept is an invitation for all who attend and visit to value, preserve, and nurture as part of efforts to create and sustain an intellectually conducive setting which enkindles the practice of symbiotic co-existence between humanity and nature.

Impact

Climate change is now affecting every country on every continent. It is disrupting national economics and affecting lives – costing people, communities, and nation states dearly today and even more in the future. Climate change is not just a long-term issue, but rather is happening daily. Climate change increases the cost of development in the poorest countries in the world between 25 and 30 percent, with a US\$700 billion gap in financing between what is available and what is needed for climate resilient infrastructure (OECD 2018). The insufficient response of policy makers often means that the poorest and most vulnerable are the most affected. At the same time, humanity has never had better know-how of solutions available to avert this crisis and create opportunities for a better life for people all over the world. Universities grant the highest degrees in education systems, and in this way, help shape economic and political leaders and managers of tomorrow. With this in mind, RCE Penang seeks to capitalise on learning as a way to solve the climate crisis, both locally and globally.

Responses/Actions Taken

The “A Day for Climate” programme supports the campaign #ClimateJusticeForAll and aims to improve education, awareness-raising, and both individual and institutional capacity-building for action on climate change mitigation and adaptation. The project was organised and participated in by RCE Sejahtera Youth (RSY) under the auspices of RCE Penang. Through this programme, RCE Penang can give both university students and the surrounding community exposure to actions they can take on climate change. Part of the challenge with addressing climate change is that the phenomenon often feels neither immediate nor personal. This programme is designed to increase participants’ awareness of the seriousness of climate change and educate them on ways to overcome it. Activities utilised included exhibition booths by NGOs working on climate issues, quizzes and games to help participants gain knowledge, pledges for university students on climate action, documentary screenings, and discussion sessions.

Participants show solidarity in fossil fuel issues.



Results

The project ended up being a great success, with the cooperation and commitment of all the partners and participants bringing awareness on climate change to university students and community members. Exhibitions from the different NGOs to a largely academic audience were a great opportunity for university students to explore the seriousness of climate change from organisations working with applied solutions to the problem. Learning from local NGOs allowed students to gain action competence in a number of skills that reduce greenhouse gas emissions within the context of daily life in Penang. Documentary screenings helped participants gain an understanding of the suffering climate change causes globally. This is critical as climate change manifests itself differently in different locations, and so understanding the

multitude of ways climate change is changing the planet allows students to innovate on the different types of mitigation and adaptation measures needed to address the issue. Participants learned that local actions have global impacts, and that in order to address global problems, a plethora of iterative local solutions is required. Learning and practicing these local solutions was what 'A Day for Climate' wanted to emphasise. By engaging with non-formal education, university students were able to learn about the impact that education can have on the behaviour of entire communities, not just university campuses. Overall, participants walked out of this programme with an enormous level of knowledge and awareness on climate change, as well as competence in actions to take in mitigating its impacts.

Collaborators hosting an exhibition booth to help promote various issues related to climate change.



A docu-movie screening and discussion on climate change attracted a large crowd.

Tips to Tackle Climate Action

What You Can Do:

A project committee should be formed to delegate tasks and to prepare a proposal and detailed programme itinerary. Following this, identify and invite collaborators such as government agencies and NGOs working on diverse causes that also support climate change issues. Next, together with collaborators, devise diverse sets of interesting activities such as exhibitions, games, docu-movies, and discussion topics to educate and connect participants on climate change. Carry out active publicity on various platforms - including social media - to promote the program. The bottom line is to make sure that every aspect of the project works towards spreading awareness and literacy on climate change issues during the events.

In this project, the project committee contacted participants directly via emails and calls - organisations agreed to participate from the initial contact. The program should be organised at a venue that can attract a large number of people and the program itinerary should be well-designed, involving a variety of different activities. These could have been the determining factors for getting the attention of stakeholders. For publicity purposes, RCE and RSY members helped in disseminating information via social media platforms amongst their networks, including email blasts via the university mailing list. All participating organisations were also requested to do the same with publicity materials provided by RSY.

Why It Matters:

Low awareness levels on climate change amongst their peers propelled RSY to take action on climate education and literacy. RSY felt that local youths should be more engaged on issues surrounding climate change. The message of the project is that climate change will affect everyone everywhere, that it has a local-to-global impact. RSY believe that climate change can be mitigated that way too. Having diverse NGOs taking part in the exhibition, discussion sessions and screenings, etc, exposed not only their peers but also the wider public in Penang, to various issues and stakeholders that can be impacted at the individual or institutional level.

Who to Involve:

In addition to RSY under the auspices of RCE Penang, this project involved two government agencies (local councils), 17 NGOs, and many other individuals and volunteers. Others included university lecturers and students, the wider university community, and the general public. Most of the collaborators invited came from the northern region of Peninsular Malaysia so as to reduce the carbon footprint for those attending. The collaboration from various organisations will help your project be even more impactful and known because they will help disseminate information about your project across their network which will eventually help achieve the aim of raising awareness, which is the core mission of the project.



Children visit the Science Express Train on Climate Change.

Chapter Asia-Pacific

Sub-National Actions for Climate Resilient Sustainable Development in Punjab, India

RCE Chandigarh



Situation

RCE Chandigarh is located in Chandigarh city which is the capital of Punjab and Haryana states in northwest India. Punjab, the activity area of RCE Chandigarh is one of the smallest states covering 1.53% (50,362 square kilometres) of the total geographical area of India. It is located between 29°30" N to 32°32" N latitude and 73°55" E to 76°50" E longitude. It is bordered with Pakistan on the west, Jammu & Kashmir on the north, Himachal Pradesh on the north-east, and Haryana & Rajasthan on the south. The major part of the state lies in the alluvial plains which include four major rivers (the Sutlej, Beas, Ravi and Ghaggar Rivers) that flow in a south-westerly direction, as well as numerous small and seasonal tributaries (choes) and an extensive

canal network in the region. The north-eastern part of the state has undulating hills (shivaliks at the foot of the Himalayas) whereas the south-western landscape is semi-arid, merging into the Thar Desert. The geography and subtropical latitudinal location of Punjab leads to large variations in temperature from month to month and the region has four seasons: winter, spring, summer, and monsoon. Punjab is divided into five agro-climatic zones on the basis of features such as homogeneity, rainfall pattern distribution, soil texture and cropping patterns. The agro-climatic zones are sub-mountainous undulating zone, undulating plain, central plain, western plain and western.

The Punjab region had a predominately agricultural economy for decades, but is now slowly advancing towards industrial development. Assessment of quality of life in urban Punjab highlights that Punjab performs better in comparison to other states (with similar per-capita income) in access to basic services. However, the agriculture sector remains the source of livelihood for 26% of the working population (*Punjab Economic Survey 2019–2020*).

Impact

Climate change is currently the most significant challenge in achieving sustainable development, both globally and for the region in particular. The vulnerable soils and water sources in the region are going to be more vulnerable by changes in weather patterns brought on by climate change. People within the region must not only adapt to this new reality, but also change their behaviour to help mitigate climate change and its effects both at the regional and global level.

Responses/Actions Taken

RCE Chandigarh is engaged with a multi-pronged learning approach to address the challenges and implications of climate change in the region by teaching about sustainable adaptation initiatives through ESD. The goal of the project was to enhance understanding about climate change and its impacts of the communities in the region through public awareness campaigns and capacity-building programmes. In order to accomplish this, an [information kit](#) on climate change in Punjab was developed, along with [brochures](#) and newsletters on climate change to assist in public awareness. For capacity building, 30 programmes for training on behavioural change and up-skilling in regards to climate change were designed by the RCE (targeting officials, teachers, and students), including capacity-building programmes on climate resilient livestock, energy auditing and conservation, climate adaptation in rural areas, and waste heat recovery for improved energy efficiency. In addition, eco-clubs of 5,500 schools (covered under National Green Corps Programme) from the formal school system built awareness and action competence in students in responding to climate change.



RCE Chandigarh
Region: Asia-Pacific

Country: India

SDG(s):
3, 6, 13, 15
Good Health and Well-Being, Clean Water and Sanitation, Climate Action, Life on Land

Theme(s):
Agriculture, Forests/Trees, Plants & Animals

Target audience(s):
Primary, Secondary, Higher Education, TVET, Teacher Education, Community, Youth (Informal)

Ecosystem(s):
Agricultural, Forest, Fresh Water, Wetlands

GAP Priority Action Area(s):
2, 3, 4, 5

Language(s) of project:
English

Contributing organisation(s):

- Punjab State Council for Science and Technology
- Punjab State Climate Change Knowledge Centre
- Consultancy Cell on Pollution Control and Energy Conservation
- Punjab ENVIS Hub
- Regional educational institutions
- Govt Departments
- GIZ
- Centre for Media Studies and Centre for Environment Education

Linkages to education and/or sustainable development policies:

- India National Action Plan on Climate Change
- Punjab State Action Plan on Climate Change

Year submitted/completed:
2018



Capacity-building of rural and urban communities.



Paddy straw management by developing pellets.



Capacity-building of rural and urban communities.

Results

As a result of this ESD project, over 1,100 officials from both the public and private sectors were trained, and over half a million students were given public awareness material and trained for taking appropriate actions on climate change in schools and universities in the region. Further, more than 10,000 individuals received climate change information from the material created by the RCE. Furthermore, the Project also trained state officials

in the collection, compilation, and analysis of state-specific climate data, provided technology demonstration sites to raise awareness on de-carbonising agriculture, promoted energy conservation through mentoring the auditing of 74 buildings in the region, and created capacity-building programmes to identify suitable climate-resilient practices and technologies for the region.

Capacity-building of rural and urban communities.



Punjab State Council for Science & Technology (5)

Tips to Tackle Climate Action

What You Can Do:

Taking a multi-sectoral approach with different target groups is critical for a climate education project of this scale. Another important action is to take into account the national and sub-national policies around climate change and climate change education, as well as taking stock of climate change risks and opportunities in the regions the project will be conducted in.

Why It Matters:

Adopting a multi-sectoral approach helps in understanding and analysing issues and providing solutions for different sectors and target groups, which is critical as mitigation and adaptation measures to climate change are often dependent on a given sector's activities. Taking stock of existing plans and policies in regards to climate change and climate change education in particular is important for integrating with existing frameworks and upscaling, rather than duplicating, existing initiatives.



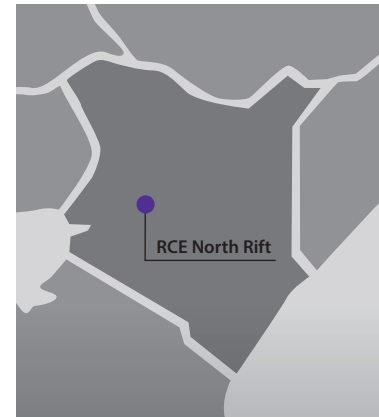
Paddy straw management by developing pellets.

Who to Involve:

For a multi-sectoral project such as this, it is necessary to involve local government departments that work with public awareness and outreach on climate change, formal education actors (including both students and teachers), different local economic sectors (agricultural, industrial, service, etc.), as well as grassroots-level organisations to reach the public within the region.

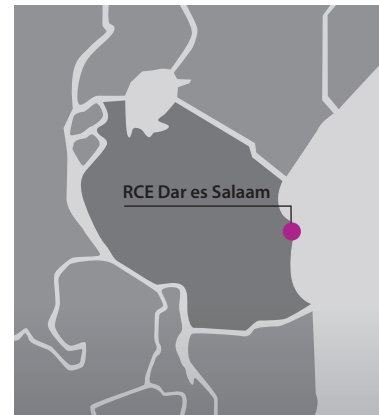


Chapter Africa



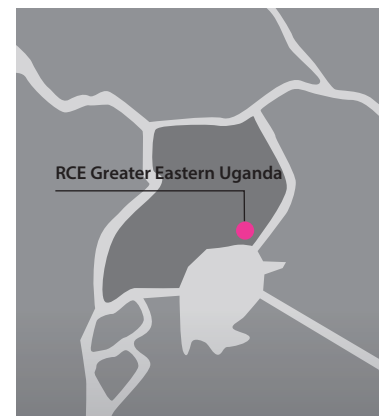
Solid Waste Management Options for Food Security, Energy & Climate Change Mitigation

RCE North Rift 30



Managing Biodiversity in a Changing Climate in the Albertine Rift Countries

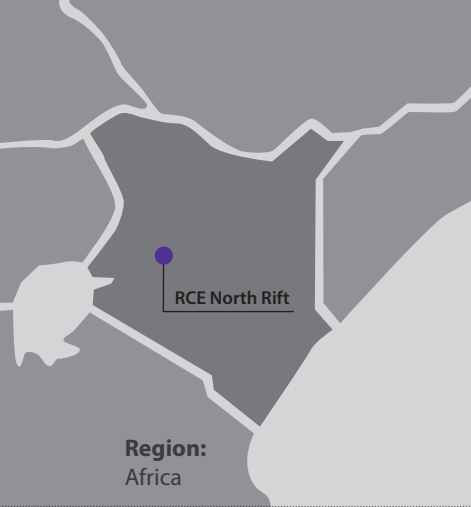
RCE Dar es Salaam 34



Stakeholder Engagement for Promoting Community Resilience to Climate Change

RCE Greater Eastern Uganda 38





Region:
Africa

Country:
Kenya

SDG(s):
2 Zero Hunger, Gender Equality, Affordable and Clean Energy, Decent Work and Economic Growth, Sustainable Cities and Communities, Climate Action

Theme(s):
Traditional Knowledge, Agriculture, Ecotourism, Forests/Trees, Plants and Animals, Waste

Target audience(s):
Primary, Secondary, Higher Education, Community

Ecosystem(s):
Agricultural, Forest, Urban/Peri-Urban

GAP Priority Action Area(s):
3, 4, 5

Language(s) of project:
English

Contributing organisation(s):
• University of Eldoret – Kenya
• Dajopen Waste Management
• National Environment Management Authority (NEMA)

Year submitted/completed:
2019



The youths sifting the organic fertiliser.

Chapter Africa

Solid Waste Management Options for Food Security, Energy & Climate Change Mitigation

[RCE North Rift](#)



Situation

Kitale is an agricultural town in the North Rift Valley of western Kenya, located between Mount Elgon and the Cherangany Hills. Historically, the region has had a temperate oceanic climate typical of Africa’s east coast, with a relatively narrow temperature range. However, climate change has begun to push temperatures higher, impacting agriculture and forestry practices in the area. Because of a changing climate, Kitale and its surrounding area faces a plethora of environmental, social, and economic

challenges as the agricultural community tries to adapt to the higher temperatures and less predictable weather patterns. These same challenges can be seen mirrored in many other agricultural communities within Kenya.

Impact

To compound the issue of a changing climate, the population of the region is increasing, and creating more waste from the industrialisation of agriculture. This not only pollutes the soil and water, but also emits greenhouse gases as they break down, further contributing to climate change. The solid waste produced also increases the presence of vermin, contaminates the soil, and pollutes and clogs streams and rivers – which can both cause flooding and create fire hazards. The increasing amount of waste generated from industrialised agricultural practices is of particular concern, as the breakdown of organic matter from farming and food waste produces a great deal of methane through anaerobic decomposition when solid waste is taken to dump sites. As methane is a greenhouse gas that is much more potent in trapping infrared

radiation than carbon dioxide, the breakdown of organic waste is a critical consideration in mitigating climate change. A comprehensive waste management system is needed to protect people’s health, safeguard ecosystems, and mitigate greenhouse gas emissions from the increasing amount of waste that contributes to climate change. In order to do this, the local community needs to be educated about responsible waste management options.

Responses/Actions Taken

RCE North Rift, which is based in the University of Eldoret in Kenya worked with an RCE member Dajopen Waste Management - a community-based organisation. Dajopen Waste Management is a non-governmental organisation which educates the residents of Kitale town on collecting and recycling waste in a more environmentally friendly manner. The project was implemented through training stakeholders within the town on alternative livelihood opportunities, including the collection and sorting of waste materials, production of recycled items, and

Members of Dajopen Waste Management sorting the bio degradable waste from inert waste.



organic farming techniques. Capacity-building programmes on waste recycling were held in order to train community members on the proper sorting and handling of different kinds of waste, including organic, paper, and plastic wastes. These capacity-building programmes were paired with public awareness campaigns that focused on educating the community members on the benefits of using recycled products. These benefits included decreased households' expenditures on goods, increased efficiency for waste sorting and collection, and a cleaner community as waste was increasingly recycled rather than disposed of. By working with the community to safeguard the environmental systems of the region, RCE North Rift members also help to tackle socio-economic issues, especially for vulnerable groups, such as women, youth, homeless families, and small-scale farmers, who are able to find livelihood opportunities through training in waste management while

simultaneously reducing greenhouse gas emissions. The trainings were supplemented with awareness-raising activities to the public at large on reducing, reusing, and recycling of waste.

Results

The results from the trainings initiated during the project include increased crop yield of small-scale farmers using organic fertiliser they learned how to make from agricultural and food waste. By composting organic waste for fertiliser aerobically, community members reduced the amount of methane their waste produced had it gone to a landfill. The increased crop yields also led to more food security for both individual households and the community as a whole. This was especially important for small-scale farmers who relied on sustenance farming to feed their households in addition to production of cash crops to sell at market. The project also resulted in better housing for slum inhabitants who had trained in waste collection

Mr. David Ngige, RCE North Rift at the Dajopen Waste Management site showing the interns from Nairobi University School of Environmental Studies how to record the waste disposed and supplied by the County Government of Trans-Nzoia Kenya.



and sorting, as they were able to generate more income from waste collection and sorting and thereby improve their household's infrastructure. The project also yielded greater household wealth for all participants who were trained in reducing and recycling waste. The community was also able to utilise some of the food and agricultural waste to create bio-fuel, further decreasing their expenditures and time spent on collecting fire wood from outside the village. The added benefit of this practice was that by using waste to create

bio-fuel, it protected the surrounding forests, as community members had less need to harvest wood for fuel from them. In addition, by diverting waste from rivers and streams, the community was better able to safeguard local flora and fauna within the region. Furthermore, because of the increased household wealth, the local government has been able to collect enough tax revenue from the local community to create a formal waste collection and recycling service.

Tips to Tackle Climate Action

What You Can Do:

RCE North Rift and the Dajopen Waste Management Project aims at tackling the socio-economic and environmental conditions of vulnerable communities through a community-based waste management strategy. Such a strategy is implemented through collection of waste materials for production of recycled items and the training of other self-help groups and actors regarding alternative livelihood opportunities, waste management, and organic farming. A key component of such an initiative is to train community members on how to recycle urban and peri-urban waste.

Why It Matters:

Teaching the public how to properly handle urban/peri-urban waste matters not only in efforts to mitigate climate change, but because handling and disposal of waste relates to so many critical public health issues, such as unregulated waste disposal sites becoming breeding zones for flies, mosquitoes, and rodents. The above causes outbreaks of cholera, malaria, and rabies. Recycling waste for bio-fuel also has the benefit of protecting local bio-diversity, as the community has a ready supply of fuel for cooking

and heating without needing to harvest from nearby forests.

Who to Involve:

Researchers and the benefitting communities both have to be involved. RCE North Rift covers the six counties of Uasin Gishu, Nandi, Trans Nzoia, West Pokot, Elgeyo Marakwet and Baringo county, and was thus able to tailor waste management strategies to specific community needs across each county. Other waste recycling projects include an e-waste collection centre at Eldoret National Polytechnic and a bio-fuel briquette making from waste materials such as saw dust by one community-based organisation (CBO) in Eldoret town. Linking waste management to other projects such as climate action and biodiversity conservation through promotion of activities like tree planting is recommended, but this means linking with stakeholders in these types of projects early on in the implementation phase.

More Information:

[Video: Dajopen Waste Management Project: Kenya organic fertilizer](#)

[Dajopen Waste Management](#)



Lake Manyara National Park, Arusha, Tanzania.

Hanvey Barrison, CC BY-NC-SA 2.0

Chapter Africa

Managing Biodiversity in a Changing Climate in the Albertine Rift Countries

RCE Dar es Salaam



Situation

The Albertine Rift countries of East and Central Africa are characterised by both high levels of biodiversity and high levels of poverty. The majority of the rural poor in countries like Tanzania are dependent on biodiversity and the ecosystem services it provides for their livelihood. Furthermore, the growing tourism industry in the country is increasingly being structured around nature-based ecotourism, with the majority of tourists coming to the country to experience its unique landscapes and fauna. Understanding the challenges posed by climate change and learning how to manage both the country's and the wider region's biodiversity in a changing climate is crucial for ensuring sustainable development for communities and that protects wildlife and ecosystems as the ecotourism sector grows.

Impact

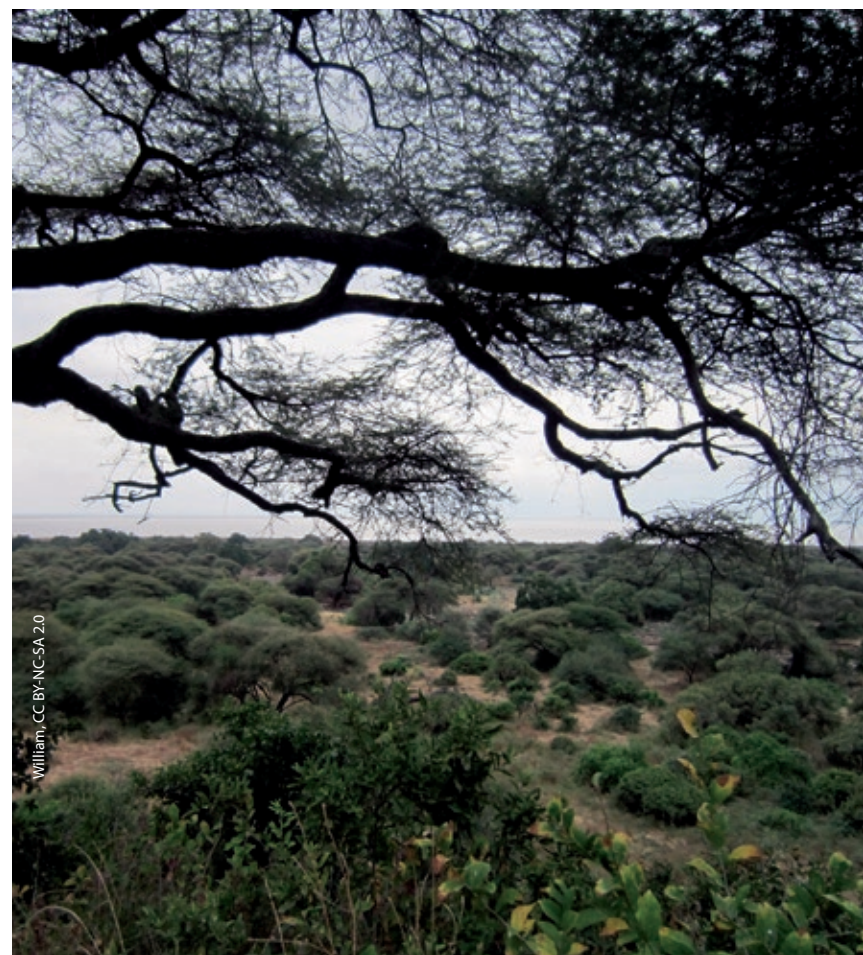
The changing climate is contributing to the loss of biodiversity across the globe, with the loss of biodiversity felt the most acutely by the rural poor in Least Developed Countries such as Tanzania. Changing average temperatures mean that species' habitat zones and migration routes are both shrinking and shifting as temperatures increase and precipitation patterns change. The loss of biodiversity imperils the world as a whole by reducing the resiliency of natural ecosystems on which all life is dependent. The breaking down of ecosystems also impacts social and economic systems, which impact many different economic sectors such as nature-based ecotourism, which Tanzania is especially dependent on. For countries like Tanzania which depend on biodiversity for its

citizens' livelihoods and which is also highly climate-sensitive, climate change imperils the functioning of its environmental, social, and economic systems. Therefore, capacity-building on creating public awareness around how to manage both the country's and the region's biodiversity in a changing climate is a vital imperative.

Responses/Actions Taken

The overall objective of the ESD project was to use hands-on training to support graduate students in Africa as well as early to mid-career conservation researchers and professionals on how climate change impacts biodiversity in the region. This was done by developing and implementing an education and training programme on climate change and its impacts on biodiversity at the Institute of Resource Assessment at the University of Dar es Salaam. The project focused on not only creating in-class lecture material, but included extensive

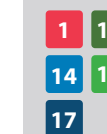
Lake Manyara National Park, Arusha, Tanzania.



William, CC BY-NC-SA 2.0



Country:
Tanzania



SDG(s):
No Poverty, Climate Action, Life Below Water, Life on Land, Partnerships for the Goals



Theme(s):
Disaster Risk Reduction, Traditional Knowledge, Agriculture, Curriculum Development, Ecotourism, Forests/Trees, Plants & Animals, Waste



Target audience(s):
Higher Education, Community



Ecosystem(s):
Agricultural, Coastal, Dryland, Fresh Water, Grassland, Mountain, Urban/Peri-Urban, Wetlands



GAP Priority Action Area(s):
1, 2, 3, 4, 5



Language(s) of project:
English



Contributing organisation(s):

- Institute of Resource Assessment – University of Dar es Salaam
- Ministry of Natural Resources and Tourism, Tanzania



Linkages to education and/or sustainable development policies:

- Protected Areas Management Plans
- Single Species Action Plans



Year submitted/completed:
2018



Lake Manyara National Park, Arusha, Tanzania.

field visits to biodiversity sites within Tanzania and the supervision of a number of individual conservation projects in various protected areas to better understand how climate change impacts biodiversity conservation. While in the field, participants learnt about challenges and strategies to support conservation in a changing climate (e.g. protection of wildlife migratory corridors, supporting community-based conservation activities, supporting conservation-friendly income generating activities which minimise human-wildlife conflicts). The participants also had extensive training on the SLOSS concept (Single Large Or Several Small) used in protected area planning and its relevance in biodiversity conservation in a changing climate, so they could contribute to habitat design for given species and ecosystems.

Results

This training enhanced capacity of participants to contribute to national efforts that aim to mainstream mitigation and adaption to climate change in revised biodiversity management plans and strategies in their countries (Tanzania, Uganda, Burundi, Rwanda, and the Democratic Republic of the Congo). The mainstreaming of climate change was necessary in most revised Protected Areas Management Plans and/or Single Species Action Plans, and this training gave the conservation researchers and professionals the added know-how on how to do this. While most education initiatives on climate change focus on aspects of mitigation, it is also critical to engage with education on appropriate adaptation measures, especially in relation to projects involving conservation planning and ecotourism. This educational approach allows for projects that will protect both species and ecosystems now and in the future under a changing climate.

Tips to Tackle Climate Action

What You Can Do:

Trainings that aim to mainstream climate change adaptation strategies into national policies, plans, programs, strategies and projects should be more targeted and focused in terms of the trainers and the training participants. Experienced trainers from within a region are highly recommended to share their practical experiences on what works better under business-as-usual scenarios and in the changing climate. Trainers from other regions from across the globe can be invited to share lessons learnt in the implementation of various climate change-biodiversity conservation projects in their own regions/countries. The training should give priority to practitioners and/or managers working in different protected areas, as different ecosystems and species require different management and conservation responses in the face of climate change.

Why It Matters:

It is much easier for participants to design a conservation project that aims to mainstream climate change action into a particular area they are familiar with. Participants outside of conservation circles have a difficult time in conceptualising a practical project to implement in their own country or locality and often struggle to get a host

institution to support them. Generally, engaging the practitioners guarantees sustained knowledge and practice in the conservation practices that will be implemented. It also better prepares those trained to take an adaptive approach to managing biodiversity, taking into account both a changing climate and localised contexts. Since most biodiversity management practices were created under a paradigm of a stable climate, it is crucial to stress this adaptative approach in trainings for effective conservation projects.

Who to Involve:

To make more of an impact, the training program should not be restricted to participants working for national governments only. The training should also involve the private sector (including privately-owned conservation areas and local ecotourism companies), the communities (community-based conservation initiatives) and non-governmental conservation organisations (including local, national, and international conservation organisations that are operating in a given region). While experts in conservation should be the target audience, these experts do not just come from one sector.

SDG(s):
3 Good Health and Well-Being,
4 Quality Education, Gender
Equality, Clean Water and
Sanitation, Affordable and
Clean Energy, Climate Action,
15 Life on Land

Theme(s):
Disaster Risk Reduction,
Traditional Knowledge,
Agriculture, Curriculum
Development, Ecotourism,
Forests/Trees

Target audience(s):
Primary, Secondary, Higher
Education, TVET, Community,
Youth (Informal)

Ecosystem(s):
Agricultural, Forest, Fresh
Water, Grassland, Mountain,
Urban/Peri-Urban

GAP Priority Action Area(s):
1, 2, 3, 4, 5

Language(s) of project:
English

Contributing organisation(s):

- Busitema University
- Nature Uganda
- Busia District Local Government
- Tororo District Local Government

**Linkages to education and/
or sustainable development
policies:**

- The National Community Development Policy of 2015
- The National Environment Management Policy of 2014

Year submitted/completed:
2019



Biology Research teams from Busitema University at West Bugwe Central Forest Reserve.

Chapter Africa

Stakeholder Engagement for Promoting Community Resilience to Climate Change

RCE Greater Eastern Uganda



Situation

Uganda's forests are an important natural asset, locking in carbon, preventing soil erosion, and contributing about 8.7% to the national economy based on conservative estimates (NEMA 2011). Sustainably managed forests give environmental benefits, including benefits towards mitigating climate change, as well as sustainable economic development and improving the quality of life of people across the country. Based on analysis of

satellite imagery in 2015, the Ministry of Water and Environment identified the West Bugwe Central Forest Reserve (CFR) – which covers a total area of 3,867 hectares (38.671 km²) – as one of the 10 restoration hotspots in Uganda for biodiversity integrity, since it has experienced high rates of deforestation between 1990 and 2015 (FSC 2018). The World Bank (1993) listed it among one of the Ecologically Sensitive Sites in Africa. However, Eastern Uganda is seeing much of its land continue to shift towards agricultural production, with an increasing number of farm holdings producing cash crops such as coffee, cotton, bananas, potatoes, millet, and sorghum. If this continues, many landscapes will be transformed from carbon sequestration sites into sources for greenhouse gas emissions from agricultural activities.

Impact

The forest has been highly degraded by agricultural encroachment, illegal timber harvesting, and

charcoal burning, among other causes. This has severely impacted its ability to sequester carbon, and has impacted its ability to provide habitat for native biodiversity. West Bugwe CFR supports two endemic species of trees (*Maesa welwitschii* and *Phyllanthus reticulatus*) and one endemic butterfly (*Belenois rubrosignata kongwana*) not found elsewhere in Uganda's protected area system. Activities such as agricultural expansion, intensification, and de-vegetation are the leading causes of loss of carbon stock, species loss, and depletion of natural vegetation.

Responses/Actions Taken

Institutional engagement for forest management from local actors was needed, including strong support from public sector actors such as Busitema University and the Busia Local Government, as well as from the local private sector, conservation agencies, and the local community itself. This involved strengthening the capacity of the

Visits to neighbouring school for conservation education programme.



stakeholders for effective management of the forest through stakeholder sensitisation, training of forestry staff, and deployment of research and administrative capacities to both monitor the forest and implement conservation actions. Training and capacity development programmes started at wildlife/ecotourism centres on how to effectively use office and field equipment to monitor the forest. The staff were trained in the use of global positioning system (GPS) and remote sensing technology to map resources and to track the location of activities and events such as charcoal making, forest fires, and human-wildlife conflicts. The next step was promoting collaborative management, firstly through sensitisation of the community through training, and then mobilising community-based institutions to aid in monitoring and management of the forest. This was to promote ownership of the initiative and buy-in by the local stakeholders in actively conserving the forest's resources. Next, training and mobilisation for forest restoration activities took place, through raising seedlings in nurseries, preparing planting sites, and training the community to implement soil and water conservation measures around the forest. Finally, the community was trained in Alternative Income Generating Activities (AIGAs), and received start-up finance and value chain support for income generation activities, which supplemented household income while reducing their impact on the forest and its constituent ecosystems. Some of the many successful AIGAs include establishing fruit orchards, mushroom cultivation, bee keeping, and seedling/nursery development. The success of the project has led to the creation of a learning dialogue with a neighbouring RCE in Kenya – RCE Kakamega – which allows for both RCEs to

share experiences and learn about successful implementation strategies in forest restoration and the sustainable use of forest resources from each other.

Results

Throughout the project, RCE Greater Eastern Uganda was able to develop instruments for collaboration and management among the different stakeholders, which enabled their training and sensitisation to promote practices for sustainable forest management. Some of the critical practices community members needed training in included reforestation techniques involving appropriate planting and care of local tree seedlings, as well as AIGAs to shift their economic activity towards more sustainable production and consumption practices. Key priority areas for intervention for peoples' behaviours and attitudes were identified in relation to specific deforestation practices such as harvesting fire wood or clearing the forest for agricultural land, and community sensitisation education was used as an entry-point to train and re-skill community members to practice sustainable behaviour in relation to co-existing with the forest. This enabled better protection for the forest, the life within it, and the many ecosystem services it provides. A better protected forest means more resilience in the face of climate change for both local ecosystems and the communities adjacent to them. Through this project, RCE Greater Eastern Uganda has signed a Memorandum of Understanding with the National Forestry Authority of Uganda and the International Union for Conservation of Nature (IUCN) to promote the conservation of biodiversity as a public good.



Bird-watching team visit to West Bugwe Forest.

Tips to Tackle Climate Action

What You Can Do:

RCEs can play a significant role in sustainable development by becoming a dynamic hub for lifelong learning and on-going practice in contributing to sustainable development. In order to achieve this, it is essential to engage key stakeholders in a consultative manner, and link their activities to the existing local, national, or international climate change policy. Memorandums of Understanding or Cooperation on key activities are encouraged to codify any agreed actions.

Why It Matters:

Because social acceptance and stakeholder ownership is a prerequisite for any change in behaviour and success in the project, it is critical to engage with key stakeholders on a consultative vs. a top-down approach. The goal of any project should be to create a plan that protects the forest and provides for local communities in a win-win manner for conservation and community development. Therefore, policies addressing learning for adult stakeholders regarding behaviour change around climate change must be responsive to changes occurring in both the natural environment and society.

Who to Involve:

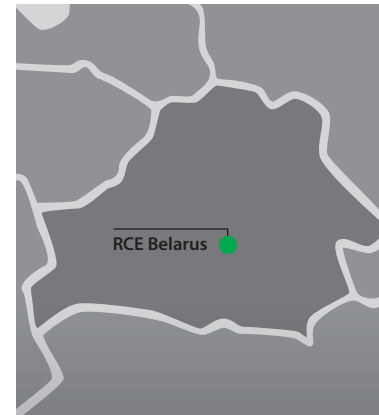
This project focused specifically on the role of collective stakeholders in building community resilience in response to climate change in regards to using a common resource. Working specifically on ESD projects at the intersection of sustainable forestry and climate change, RCE Greater Eastern Uganda recommends engagement with any national forest authority to synergise with any existing policies or education resources, local government and councils for mobilising community engagement, local workforces and/or communities using forest resources (keeping in mind a different engagement strategy may be needed for each), and any development agencies or private investors that can leverage resources for tree planting and education materials. It is especially critical to involve community members with local and traditional ecological knowledge, as they can offer critical insights into the nature and history of the surrounding ecosystems and the species within them.

More Information:

[Education for Sustainable Development Uganda Implementation Strategy](#)

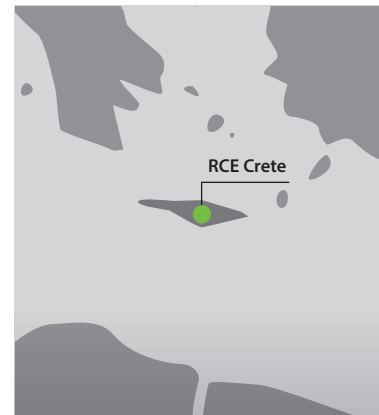


Chapter Europe



Territorial Responsible Research and Innovation Fostering Innovative Climate Action: The Belarusian Experience

RCE Belarus 44



Integrating SDGs in the MSc for Climate Change, Sustainable Agriculture, and Food Security (CCSAFS) Program

RCE Crete 48



Vocational Training in Wood as an Element of Sustainable Construction Methods

RCE Denmark 52





Climate Workshops: the first meeting with future multipliers of climate awareness.

Chapter Europe

Territorial Responsible Research and Innovation Fostering Innovative Climate Action: The Belarusian Experience

RCE Belarus



Situation

Minsk is one of the most populated cities in Europe and the capital city of Belarus, serving as the economic, industrial, and transport hub for the nation. With around two million residents in the urban area as of 2017, Minsk has a high density of emissions of harmful substances – including greenhouse gases – per unit area. These emissions create polluted ‘grey zones’ – primarily around

districts, where automobile and machinery manufacturers and transport hubs are located. There are around 20 parks and green zones in Minsk, but many new neighbourhoods still lack substantial tree cover and green spaces. In addition, urban growth has had a negative impact on habitats and biodiversity.

Impact

The urban design of the city was meant to provide for the circulation of fresh air throughout the main avenues, but the intense unsustainable urban development has increased the vulnerability of the city dwellers to the various impacts of climate change. The Territorial Responsible Research and Innovation Fostering Innovative Climate Action (TeRRIFICA) project* in Minsk aims to raise awareness to the local communities about climate change, its effects, and possible solutions for adaptation to these effects. The project activities are focused on public engagement and stakeholders’ involvement in co-creation of resilient solutions for urban challenges. However, to foster diverse public engagement, stakeholders within the city need capacity-building in order to make informed decisions and recommendations for effective climate change mitigation and adaptation activities that also empower everyone in the city.

Responses/Actions Taken

The aim of RCE Belarus’ project is to develop guidelines and educational practices to engage diverse stakeholders and local communities’ members throughout the city in the development of the climate mitigation and adaptation agenda in the city of Minsk. Engagement with communities and their respective stakeholders has been ensured through the implementation of three project phases. First, a *Knowledge Phase* was designed to provide stakeholders with basic information on climate change and urban solutions to address climate change to encourage them to learn and participate in discussions from an informed position (this included reflexive workshops, online conferences, and stakeholder mapping). Next, a *Capacity Building Phase* enabled stakeholders to co-design and co-create a future vision for a climate friendly city using ideas from living labs activities (this included stakeholder meetings, customised ESD workshops, discussion climate clubs, and local summer schools). Finally, an *Action Phase*, based on the results of the crowd-mapping of ‘climate hotspots’ within the city, best practices, and tools in climate mitigation and adaptation, collected by all pilot regions, provided a series of climate workshops as trainings for trainers of community members and living lab projects across the city.

* TeRRIFICA has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 824489.



Country: Belarus

SDG(s): 4, 11, 12, 13
Quality Education, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action

Theme(s): Curriculum Development, Waste, Forests/Trees

Target audience(s): Secondary, Higher Education, Teacher Education, Community, Youth (Informal)

Ecosystem(s): Urban/Peri-Urban

GAP Priority Action Area(s): 3, 4, 5

Language(s) of project: English

Contributing organisation(s): Education for Sustainable Development Association, Center for Environmental Solutions, EcoPartnership, Belarusian Geographical Society, Gymnasium #19 – Minsk, National Research Institute for Urban Planning, Belarusian State Pedagogical Maxim-Tank-University, International TeRRIFICA Project Consortium

Linkages to education and/or sustainable development policies: National Strategy for Sustainable Socio-Economic Development of the Republic of Belarus until 2030, Governmental Program on Mitigation Measures for Climate Change 2013–2020

Year submitted/completed: 2019

Results

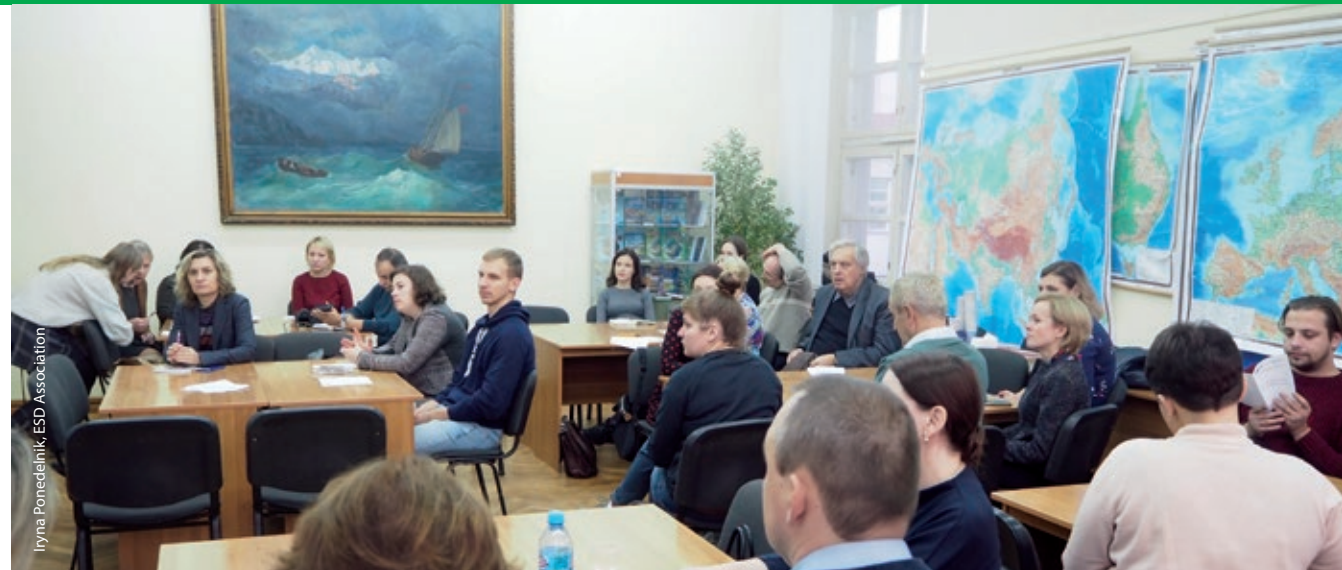
The main instrument for public engagement piloted in the project – the crowd-mapping tool – enabled the citizens to mark the positive and negative effects of climate change or climate policies in the city and provide their opinions for better solutions on 'climate hotspots'. Based on the collected data, a number of living labs' pilot projects have been developed and adapted to disseminate educational tools and resources for changing behaviour patterns and attitudes towards climate action. Thus, the project's activities have led to recommendations, tools, and methodologies that are appropriate for different communities within the urban area for learning about and taking action on climate change as it affects urban life. Due to its success in community engagement, RCE Belarus will now be responsible for disseminating educational tools for climate action throughout the region in Russian.



"The EU funded project TeRRIFICA (Territorial Responsible Research and Innovation Fostering Innovative Climate Action) with its network partners in six regions of Europe seeks best practices and identifies the approaches that are already in place to adapt to climate change effects. The project is developing solutions to address climate change – along with civil society, science, administrators, and policymakers."

TeRRIFICA Leaflet

The co-creation meeting of students and stakeholders on local climate challenges.



Meeting with various experts from NGOs, academia, and local authorities on mapping local climate issues.

Tips to Tackle Climate Action

What You Can Do:

- **Raise awareness:** organise local climate groups and explore the main global and local climate challenges, best practices and case-studies.
- **Map stakeholders:** find out what opinions and activities exist on climate change in the area regarding science, education, civil society, business and government.
- **Discuss and co-create:** organise events (science cafes, summer schools, round tables, climate clubs, field trips, etc.), where climate change can be brought up from different sectors' perspectives, and the main challenges for the region are identified.
- **Engage and empower for action:** find the proper tool (climate strike, mobile app, survey, guided tour etc.) to develop solutions for identified problems and implement local actions.

Why It Matters:

Nowadays climate change is a global issue, which affects almost all areas of human life (*United Nations Climate Change n.d.*). We have to take measures to mitigate the consequences of global warming and at the same time adapt ourselves to already changed conditions in agriculture, tourism,

and urban life. Today, 55% of the world population lives in urban areas (*UN DESA 2019*) and their health and recreation possibilities are endangered by climate change effects. City residents are exposed to the negative effects of heat waves, floods, and invasive species. Therefore the solutions have to be developed at local levels by all affected parties in a co-creative decision-making process on how to respond to climate change effectively.

Who to Involve:

Peers to involve in a project such as this include climate activists, as well as stakeholders from science, education, business, government, and civil society organisations. Local community members should also be involved for any project working in an urban environment, especially those affected by effects of climate change.

More Information:

- Crowdmapping tool in English or Russian
 - International TeRRIFICA website
 - Pilot region Minsk in TeRRIFICA project
- Facebook: @TerrificaProject, @TerrificaBelarus

Region:
Europe

Country:
Greece

SDG(s):
1 No Poverty, 2 Zero Hunger, 4 Quality Education, 6 Clean Water and Sanitation, 13 Climate Action, 15 Life on Land, 16 Peace, Justice and Strong Institutions

Theme(s):
Traditional Knowledge, Agriculture, Curriculum Development, Forests/Trees, Plants and Animals, Waste

Target audience(s):
Higher Education

Ecosystem(s):
Agricultural, Coastal, Dryland, Fresh Water, Grassland, Wetlands

GAP Priority Action Area(s):
1, 2, 3, 5

Language(s) of project:
English & Arabic

Contributing organisation(s):

- University of Crete, Greece
- UNESCO Chair in ICT in ESD
- Frederick University, Cyprus
- RCE Cairo
- Suez Canal University, Egypt
- Heliopolis University, Egypt
- Aswan University, Egypt
- Al Azhar University, Egypt
- SEKEM Foundation, Egypt
- Ministry of Education, Egypt
- Jerash University, Jordan
- University of Jordan, Jordan
- Jordan University for Science & Technology, Jordan
- Mutah University, Jordan
- Ministry of Education, Jordan

Year submitted/completed:
2018

Chapter Europe

Integrating SDGs in the MSc for Climate Change, Sustainable Agriculture, and Food Security (CCSAFS) Program

 **RCE Crete**



Situation

The impetus for integrating the Sustainable Development Goals (SDGs) into an MSc for Climate Change, Sustainable Agriculture, and Food Security (CCSAFS) programme (*Makrakis and Kostoulas-Makrakis 2020*) comes from the environmental and socio-economic characteristics of the Southern Mediterranean countries where it has been implemented. The objective of the project was to respond to the needs of an inter-disciplinary programme that will promote the entirety of the Sustainable Development Agenda, not just part of it. Students in the region need skills and tools for developing agricultural practices, policies, and measures to address the challenges that climate change poses to agriculture and food security in the region, without sacrificing progress on other SDG-related targets.

Impact

Climate change projections for the Southern Mediterranean region indicate warmer and drier conditions with increased frequency of natural disasters. Food insecurity under a changing climate is one of the major challenges of the region. Agriculture is one of the most vulnerable sectors to climate change, largely due to the limited availability of water and land resources for agricultural activities – especially in countries such as Egypt and Jordan. The added stressors of increased urbanisation eating up more agricultural land in Egypt and forced migration of refugees into Jordan adds



CCSAFS Team, including RCE Cairo and RCE Crete staff.

additional challenges for food security in a region already threatened by a changing climate. The demand for scientists with expertise in agriculture will therefore increase in the next decade within the region. There are already skill shortages in the region for expertise on plant and crop breeding, plant physiology, soil science, and horticulture. There is also a need within the region to bridge the gap between researchers, policy-makers, and farmers as well as to make climate change-related information more accessible to local actors.

Responses/Actions Taken

The project started by carrying out multi-stakeholder needs analysis and capacity-building for the staff at partner institutions who would be teaching the new MSc programme, working closely with RCE Crete partners and using the RCE model to help the Egyptian and Jordanian universities work with their own local stakeholders. The partner universities in Egypt and Jordan worked with RCE Crete and RCE Cairo to identify relevant local actors, such as NGOs active on food security, local members of the agricultural/food sector, government agencies, and other higher education partners with relevant expertise. This allowed for a platform of blended learning in the given university and with local partners to be developed and supplemented with in-field laboratories.

Results

The CCSAFS MSc programme launched in October 2018 with 45 graduate students enrolled in the programme at the two partner universities, namely, Suez Canal University (Egypt) and Jerash University (Jordan) used as hub universities, with hundreds of additional students enrolled in the Massive Open Online Courses (MOOCs) offered for the course. Diagnostic, formative, and summative assessment of all activities relating to the programme design, development, and implementation have been carried out, leading to iterative changes needed to make the programme even more successful. Formative and summative evaluations showed that the MSc in CCSAFS had a positive impact on students' skills and abilities as well as their self-esteem and confidence. Students were able to practice concepts related to addressing climate change, sustainable agriculture and food security. Additionally, students were able to give clear feedback about their knowledge regarding concepts related to sustainable ways of producing agricultural products in light of climate change and food security. The establishment of the blended learning environment and the integrated tools added value to students' learning on climate change, sustainable agriculture and food security.



Practicing sustainable agriculture.



CCSAFS MSc students doing field work.

Tips to Tackle Climate Action

What You Can Do:

Developing an MSc programme dealing with climate change, sustainable agriculture and food security (CCSAFS) is a challenging endeavour. It starts with a situation analysis, involving various stakeholders from academia and society, identifying the barriers and drivers of stakeholders' inputs, carrying out a stakeholder survey for identifying CCSAFS competences, organising colloquia and training sessions for strengthening stakeholders' inputs, developing course syllabi and course modules that reflect stakeholders' inputs, and then proceeding to course curriculum development. Validation and accreditation using internal and external peer-reviewing and piloting is also necessary, as is developing the appropriate human and technical infrastructure for monitoring quality assurance and long-term sustainability of the course.

Why It Matters:

The above steps reflect a participatory approach to curriculum development. Usually, curriculum development is expert-driven leaving those who are concerned with implementation of the practices without any involvement. Thus, participation rarely extends beyond the delivery of the courses. Much greater benefits can be achieved by encouraging active participation throughout the entire curriculum development process. Our experiences throughout the CCSAFS project show that it gives us greater opportunities for discussion and reflection with different stakeholders. This makes all involved learn, work more effectively, share and co-construct knowledge, resulting in the study programme becoming more relevant to real needs and the local context.

Who to Involve:

Besides partner universities and RCEs, both internal (academia) and external stakeholders (society) were involved. Internally, the project involved students, teaching staff, and administrators at various levels. Externally, it involved key experts from local NGOs, civic societies, governmental authorities, and professionals in the field of CCSAFS. The methods used for eliciting stakeholders' inputs included SWOT analysis, quantitative surveys, world cafe techniques, and individual and focus group interviews. Through this process the stakeholders' capacity-building for getting involved and eliciting inputs was strengthened. Capacity-building and dissemination were enhanced through the development and use of an online community of practice and a blended learning and training environment.

Acknowledgement

The MSc in Climate Change, Sustainable Agriculture and Food Security has been developed through funding from the European Commission ERASMUS plus (No. 573881-EPP-1-2016-1-EL-EPPKA2-CBHE-JP), coordinated by Prof. Dr. Vassilios Makrakis. The content of the paper reflects the views of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Vocational Training in Wood as an Element of Sustainable Construction Methods

RCE Denmark



Situation

In the Northern European region, there is a solid sustainable forestry tradition. When building with wood as the building material, carbon emissions are lower than building with conventional building materials. A cubic metre of conventional building material involves emissions of 1.2 to 1.5 tonnes of CO₂ during production. On the other hand, a cubic metre of wood as building material can store 0.7 to 1.0 tonnes of CO₂ (Træ Information n.d.). In other words, there is a great potential for a green transformation of the construction and building industry if wood is used as a sustainable building material. This transformation starts in the educational system by developing teaching materials on building methods using wood in order to reduce carbon emissions.

“When I finish my education as a carpenter, I’ll start my own business offering sustainable building methods”.
– Apprentice Emil Brogaard.



David Røngang

Impact

In 2015, global carbon emissions from the construction industry accounted for nearly 39% of total emissions (Aalborg University 2020); half of these emissions come from the way we are building (production and transportation of building materials), and the other half comes from our planning of energy application within buildings. This makes the construction industry one of the largest single sources of carbon emissions (Christensen 2019). By changing our building methods and materials, we could have an enormous impact on mitigating climate change.

Responses/Actions Taken

RCE Denmark has signed a contract of cooperation with NEXT Education in Copenhagen on a four-year innovative project (the project detailed here), where most carpentry apprentices in the metropolitan area of Copenhagen are given the opportunity to receive a certificate of sustainable building construction together with their apprenticeship. The goal is – by 2024 – to have the first graduates being able to do sustainable construction based on the newest knowledge and research available. The title of the project is ‘The wood construction industry for sustainability’.

The project is initiated and driven by the carpentry apprentices themselves, their teachers, and the school’s management, in cooperation with all partners in RCE Denmark. This first phase of the project (completed in February 2021) was seen as a test pilot for the full project which is expected to run from August 2021 until 2024. In the main project the wood worker apprentices and their teachers are also participating.

The apprentices gain knowledge on and practise with sustainable construction materials (wood fibre both as isolation material and panels) and new construction methods (constructing walls (interior and exterior) and roofs (outer and inner) all while having the least amount of impact on the environment as possible. Additionally, the apprentices are introduced to the SDGs, balancing the three dimensions of sustainable development; economic, social, and environmental, with specific examples in the curriculum on:

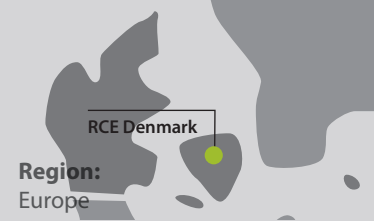
- Life cycle assessment in building construction;
- Recycling and waste sorting;
- Equality between the sexes and ethnic groups;
- Social benefits with a well-functioning tax system; and,
- Acknowledgement of the right to organise unions.

Results

The preliminary results are already very promising:

- More and more apprentices are getting involved with the project and want to achieve the learning and competencies needed for a green transition of the building and construction industry.
- Both carpentry education and business are very male-dominated industries, but the focus on sustainability seems to attract women, and there are more women among the apprentices studying sustainable building construction, compared to apprentices in other carpentry programmes. A positive consequence of that is also more debate about equality, the different conditions of the sexes and how to ensure young women’s well-being.
- The apprentices become ambassadors in the companies and inspire their master carpenters, who themselves start looking for training and how to restructure their business in a more sustainable way.
- The project has experienced great support and curiosity from the entire value chain in the building construction industry, from other educational institutions, the Danish National Commission for UNESCO, as well as from the Danish Ministry of Foreign Affairs (due to its connection to the SDGs).

It is also very interesting to learn how the collaborative environment between apprentices and teachers is empowered and leveraged, as they all are in the same boat together so to speak. A very important notion here is that everyone participates voluntarily in this ESD project.



Region:
Europe

Country:
Denmark

SDG(s):
 4 Quality Education,
 5 Gender Equality,
 11 Sustainable Cities and Communities,
 12 Responsible Consumption and Production,
 13 Climate Action,
 17 Partnerships for the Goals

Theme(s):
 Curriculum Development,
 Vocational Education, Forestry,
 Whole Institution Approach

Target audience(s):
 TVET

Ecosystem(s):
 Forest, Urban/Peri-Urban

GAP Priority Action Area(s):
 2, 4, 5

Language(s) of project:
 Danish & English

Contributing organisation(s):

Educational institutions:	• 2030skoler
• Next-Education Copenhagen	• Danish National Commission for UNESCO
Research institutes:	Manufacturers:
• Aalborg University	• Træfiber Danmark
• Træ Information	• HornGroup
• EPUC (Vocational Pedagogical Development Centre)	Building companies:
• Ungdomsbyen (National Coordinator for the Danish National Commission for UNESCO’s SDG Schools)	• Jakon
Unions and NGOs:	• MTHøjgaard
• 3F (Union)	• Juul Nielsen
• DEG (Danish Vocational Schools and High Schools)	• Combibyg
	Finance:
	• Tuborg Fondet
	• Johannes Fog Fond
	• Bosch
	• Merkur Cooperative Bank

Linkages to education and/or sustainable development policies:

- Strategy for UNESCO – Danish priorities 2019–2022
- Denmark’s Integrated National Energy and Climate Plan 2020

Year submitted/completed:
 2019 (test pilot project still in process)

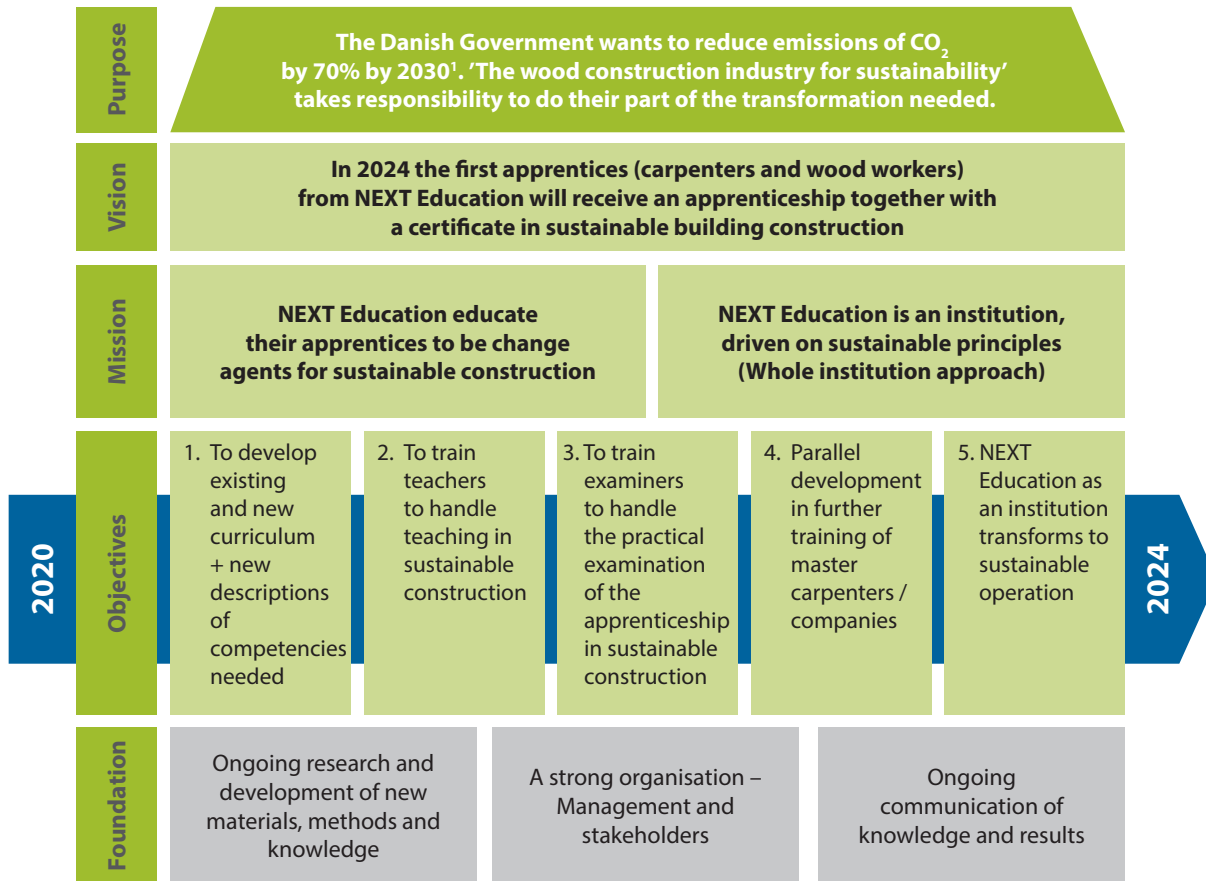


Figure 1: 'Overview of the strategic plan for the project'
© RCE Denmark/NEXT Education
¹ (Danish Ministry of Climate, Energy and Utilities 2019)

Tips to Tackle Climate Action

What You Can Do:

An educational institution who wants to develop the crafting industry in a sustainable direction needs to do a lot of research on sustainable methods, since it will probably be a frontrunner of a new movement. The methods used in this project specifically are based on sustainable forestry.

The two organisations involved in the project made a lot of effort to make sure that the building methods were buildable solutions, meaning that all materials

needed were part of an all-in-one solution to local needs and resources, and fit in with national regulation (relating to security, fire, and moisture).

This project is based on a combination of the formal educational system, effective collaboration with the private sector, and voluntary participation from apprentices, teachers and stakeholders. This combination has given an enormous driving force and sense of empowerment.



Group of teachers in a workshop about sustainable building methods.

Why It Matters:

The global population will keep increasing. Luckily the world has been successful in reducing hunger and poverty. But the resulting increase in total number of people, will mean an enormous need of new housing to come. Our buildings and constructions are responsible globally for 39% of the total CO₂ emissions. There is a big potential in finding sustainable solutions fulfilling the need of housing and urban construction while avoiding putting a huge strain on the environment.

In Denmark the government has a goal of 70% reduction of the CO₂ emissions by 2030, but the government has been unclear regarding how this goal should be reached. Contrary to this, the concern about future climate changes makes companies, NGOs, research institutions etc. take action themselves, which make them a very important driving force in the highly needed sustainable transition process. Our experience has been that when we act, others are inspired and follow. Civil activism and empowerment are very important drivers right now for such a project.

Who to Involve:

- Research institutions and companies working with sustainable building methods and materials.
- Teachers who are curious on learning about new sustainable building methods.
- Apprentices wanting to make a difference in their early careers.
- Private funds from financing projects involving education, sustainable development, civil activism.

"I have spoken with my master and he'll start using the sustainable methods I have learned."

Apprentice David Dylan Ringved-Petersen

NEXT Education Copenhagen is the largest vocational school in Denmark offering a wide palette of youth education and further training:

- 43 vocational educations
- 17 combined vocational and high school educations
- 4 high school educations
- 5 different directions of 10th grade of primary school
- 200 different courses of training
- 6.891 students per year
- 854 employees

For additional information on this project, please contact:

David Rangan, Teacher and Sustainable Coordinator, NEXT Education, member of board RCE-Denmark, dara@nextkbh.dk
Trine Alette Pantou, Head of Secretariat, RCE Denmark, trine@rce-denmark.dk



Chapter Americas



How Urban Youth Can Be an Engine to Achieve Low-Carbon Sustainable Lifestyles: Beginning in Bogota

RCE Bogota 58



Landslide Risk Assessment in St. Vincent and the Grenadines

RCE Grand Rapids 62



The Girasoles Project

RCE Greater Atlanta 66





RCE Bogota

Region:
Americas

Country:
Colombia

11 **12** **13** **SDG(s):**
Sustainable Cities and
Communities, Responsible
Consumption and
Production, Climate Action

Theme(s):
Agriculture, Plants and
Animals, Waste

Target audience(s):
Primary, Secondary, Higher
Education, Teacher Education,
Community, Youth (Informal)

Ecosystem(s):
Urban/Peri-urban

GAP Priority Action Area(s):
2, 4, 5

Language(s) of project:
Spanish

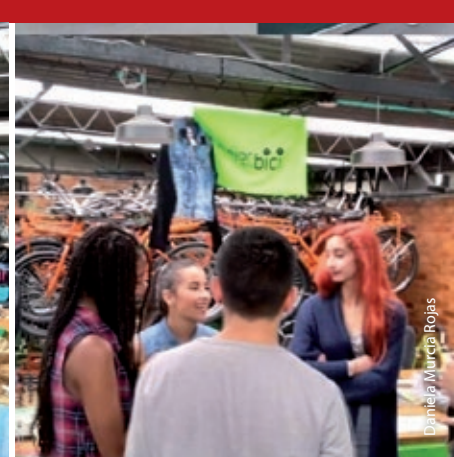
Contributing organisation(s):
• El Bosque University
• Colombian Ministry of
Environment and Sustainable
Development
• Environment Office of the
Municipality of Bogota
• UN Environment

**Linkages to education and/or
sustainable development
policies:**
• National Sustainable
Consumption and Production
Policy
• National Environmental
Education Policy
• National Climate Change
Policy

Year submitted/completed:
2019



Environmental Fair.



Mobility Fair.

Chapter Americas

How Urban Youth Can Be an Engine to Achieve Low-Carbon Sustainable Lifestyles: Beginning in Bogota

RCE Bogota



Situation

Bogota is the capital and the largest city in Colombia, with approximately eight million citizens. Set within a mountain range with an abundance of freshwater, the city is in need

of innovative projects to address the sustainable use and consumption of its resources. This project has sought to involve urban youth as catalysts for change, by helping them to gain knowledge in order to empower them in the search for a more sustainable city by addressing the consumption of resources within the city.

Impact

Due to consumption patterns associated with people in urban and peri-urban areas such as Bogota, the challenges in mitigating climate change and achieving sustainable development are growing. Traffic congestion, poor waste management, and other sources of pollution have negatively impacted the region's multiple streams and rivers, air quality, and soil. As the number of urban and middle-class consumers increase in the world's cities, their consumption choices, especially those of the young, will define the sustainability of development for coming generations. These citizens need to understand that they have the power to change their patterns of consumption, by moderating their daily actions and habits, and that this will not only have an impact on the environment, but also on their own lives and health. It is therefore imperative that young people in cities like Bogota understand the appropriate concepts of sustainable consumption, which allow them to reduce their carbon footprints through the participatory identification of priority actions to take in a local context and the definition of replication models.

Responses/Actions Taken

The project used a number of different strategies to address issues relating to sustainable consumption within Bogota. First, an open call was made for initiatives from young entrepreneurs to promote low-carbon lifestyles within the city of Bogota around five different domains: mobility, food, housing, consumer goods, and leisure. These initiatives were featured in 25 events that were held throughout the year by El Bosque University, with the help and participation of RCE Bogota as a partner, to educate the public about the actions they can take to reduce the carbon footprints of their consumption patterns. A communication strategy was also developed through three different social networks as a mechanism to reach a wider audience of young people and link them to applied learning on low-carbon consumption, which resulted in the development of two mobile applications for this purpose.

Results

In the evaluation phase of the project, it was found that over 60% of young people had changed their mode of transit to reduce carbon emissions, and over 60% of young people had decreased their consumption of meat to reduce their carbon footprints. Nearly 76% of young people reported changing their purchasing habits after participating in the RCE project, 78% of young people reported separating their waste at home, and 95% of young people reported being more aware of the environmental impacts of their leisure activities than in the previous year.

AUDITORIO FUNDADORES



Young leaders.

Maria Alejandra Castro

Tips to Tackle Climate Action

What You Can Do:

The first step is to select a target audience, followed by the development of a diagnostic mechanism in order to learn about the consumption patterns, cultural activities, and knowledge of the target audience in terms of sustainability and environmental impacts related to consumption. The next step is to design a campaign (virtual and face-to-face) that is striking and interesting to the target audience. If the target is youth, the campaign must include short messages, compelling data, and appealing imagery. The campaign should respond to the findings of the diagnosis and fill in the gaps of information that were found. Following this, the next step is the implementation of the campaign, showing key information and messages regarding sustainable lifestyles through a fun way. The final step is to measure the impact of the campaign. This could be done through surveys, focus groups,

as well as several other indicators, such as using carbon footprint or ecological footprint tools to monitor changed behaviour. The findings must be documented and communicated in an effective way to all the actors involved to ensure continuity and replication.

Why It Matters:

Promoting sustainable lifestyles has proven to be key to achieving responsible consumption to reduce carbon emissions among populations. Informing people of the direct and indirect environmental impacts associated with their consumption patterns, along with the actions they can take to tackle them is fundamental to ensure the adoption of long-term habits. Sustainable Development Goals 4 (Quality Education) and 12 (Responsible Consumption and Production) present in their targets 4.7 and 12.8 respectively,

the sustainable lifestyles as key to achieving sustainable development, which are integral in achieving Sustainable Development Goal 13 (Climate Action).

Who to Involve:

This campaign can involve different actors, such as companies and small businesses that promote sustainable lifestyles through their products and services, academic institutions to reach students, government institutions to increase the scope of the project to other segments of the population, and environmental organisations that promote events and activities related to sustainable

production and consumption. These are further described as follows:

- Academic institutions: such as universities and schools.
- Government organisations: such as the Ministry of Environment or Regional Environmental Agencies.
- Companies and local businesses that promote sustainable lifestyles through their products and services.
- Environmental institutions and organisations.
- University networks such as the RCE network.
- NGOs.

The project had a first phase in the years 2017–2018, where it worked jointly with UN Environment. During 2019, the project continued working with other strategic allies and by 2020, a new phase of the project was being developed in alliance with the Swiss Embassy in Colombia (COSUDE in Spanish) and RCE Bogota on sustainable lifestyles with an emphasis on water resources. The project has proven to have a very positive reception, through the exponential increase in followers on its social networks. It has been possible to build a community of more than 12,000 followers on Facebook and more than 6,000 followers on Instagram. Social networks have been fundamental in increasing the scope of the project that was initially carried out only for the city of Bogotá, but thanks to these tools, the project has achieved visibility in different cities around the country.

been fundamental in the development of the project, and as multipliers of the information with their communities. Different pedagogical tools have been developed, both virtual (through social networks) and face-to-face (with a game circuit) that have made it possible to carry out the activities proposed by the project.

Virtual events have proven to be an excellent platform to promote the campaign. These events tend to be very far-reaching as people from all around the country can participate and also different topics related to the Sustainable Lifestyles domains are addressed. The contests have been a platform for interaction with the followers of the campaign. Not only do they promote the call to action because they seek that the community demonstrate the adoption of sustainable lifestyles, they are also a visibility platform for local businesses that allow those lifestyles to be a long-term habit.

Although the project was destined to end in 2018, thanks to the alliances made with different institutions, it has been able to continue working and generating new dissemination strategies.

There is a group of approximately 30 young leaders (students and professionals) who have

More Information:

- Instagram: @modoaccionsostenible
- Facebook: @modoaccionsostenible
- Twitter: @modosostenible
- Project Website: <http://enmodoaccion.com/>



Steep slopes and intense storms create risks for landslides in St. Vincent and the Grenadines.

Chapter Americas

Landslide Risk Assessment in St. Vincent and the Grenadines

RCE Grand Rapids



Situation

Saint Vincent and the Grenadines is a disaster-prone archipelagic country in the southern Caribbean. The island of Saint Vincent is volcanic, with steep slopes and little level ground. Although Saint Vincent and the Grenadines is located in the Caribbean, its southerly location protects it from most hurricanes. However, it is prone to intense storms that hammer the islands with precipitation and strong winds. The combination creates a substantial risk for landslides and erosion along the rugged landscape.

Impact

Climate change has made the risk of landslides all the greater. The weather is becoming more variable. Both rainfall and droughts are becoming more intense. For example, the storm and floods of 24–25 December, 2013 were very destructive. At least nine Vincentians lost their lives and more than 11,000 people were affected. The flood caused damage totalling EC\$291 million (US\$108 million) – 15% of the country’s Gross Domestic Product (Rodrigues et al. 2014). Experts expect rainfall to become more variable with intense bursts followed by longer

droughts. This will increase risks for landslides and reduce agricultural productivity (Simpson et al. 2012). Warming seas will lead to coral bleaching events and a significant drop in fisheries catches (Food and Agriculture Organization of the United Nations 2013).

Responses/Actions Taken

As a first step, Dr. Erik Nordman of RCE Grand Rapids collaborated with the Pan American Development Foundation (PADF) to write a curriculum on disaster risk reduction and climate change adaptation for Saint Vincent and the Grenadines using the risk models the students at RCE Grand Rapids had generated as part of their course work. Next, 106 young adults from three vulnerable communities within Saint Vincent and the Grenadines participated in the curriculum during the autumn semester of the same year. The RCE Grand Rapids students linked with both the PADF staff as well as the community members from Saint Vincent and the Grenadines via video conferencing so the different stakeholders could share results and incorporate feedback into updated models and community disaster plans. Finally, university students from RCE Grand Rapids in an advanced undergraduate class – Applied Spatial Analysis of Natural Resources – created a [landslide risk model](#) for Saint Vincent and the Grenadines using GIS software.

Workers rebuild a bridge that was destroyed in a storm.



RCE Grand Rapids

Region:
Americas

Countries:
United States,
Saint Vincent
and the Grenadines

9 11 13 SDG(s):
Industry, Innovation and Infrastructure, Sustainable Cities and Communities, Climate Action

Theme(s):
Disaster Risk Reduction, Curriculum Development

Target audience(s):
Higher Education, Community

Ecosystem(s):
Coastal, Mountain, Urban/Peri-Urban

GAP Priority Action Area(s):
5

Language(s) of project:
English

Contributing organisation(s):
• Grand Valley State University
• Pan American Development Foundation
• Nordman Sustainability Solutions

Year submitted/completed:
2015

A resident explains how flooding from an intense storm damaged her home and scattered debris around her property.

Results

The goals were to:

- Develop a corps of informed, skilled, and dedicated youth who can reduce risks associated with natural hazards, including climate change, in their communities;
- Empower youth to be active change agents in their lives and communities; and
- Promote sustainable livelihoods that provide appropriate job opportunities to unemployed youth.

These goals were achieved. More than 100 students graduated from the training program. The participants actively made their communities less vulnerable to severe weather and coastal erosion by planting grass and trees in targeted areas. They created hazard maps to identify problem areas, such as sites at risk of landslides or flooding, and created disaster kits for homes and workplaces. These graduates are ambassadors for climate and disaster resilience in their communities.

Tips to Tackle Climate Action

What You Can Do:

Hazard mapping is an engaging activity that can be done at low cost. Participants can use GPS units or phones to mark the locations of key hazards in their communities, such as low places prone to flooding, poor infrastructure like large potholes, or hazardous trees. These can be reported to the appropriate officials for remediation.

Why It Matters:

Removing hazards improves climate resilience. In the short term, we can't stop climate-fueled storms, but we can trim a tree so a limb does not damage an electrical wire, causing an outage.

Who to Involve:

Community residents of any age, local authorities, such as first responders, emergency managers, disaster management agencies, meteorological services, and/or schools.







Erik Nordman





RCE Greater Atlanta

Region:
Americas

 **Country:**
United States

SDG(s):
  Good Health and Well-Being,
  Decent Work and Economic
Growth, Climate Action, Peace,
Justice and Strong Institutions

Theme(s):
  Agriculture, Curriculum
Development

Ecosystem(s):
Agricultural

GAP Priority Action Area(s):
1, 3

Language(s) of project:
English

Contributing organisation(s):
• Emory University Nell Hodgson
Woodruff School of Nursing
• Farmworker Association of
Florida
• La Isla Network (Media
Collaborator)

**Linkages to education and/or
sustainable development
policies:**
This project provides a scientific
basis for future policies for a
heat standard for heat illness
prevention training and heat
prevention workplace standards.

Year submitted/completed:
2018



Valerie Mac, PhD, RN, FNP-C, ENP-C

Videographer Tom Laffay, BA, from La Isla Network filming *Facing the Sun* on site.

Chapter Americas

The Girasoles Project

 **RCE Greater Atlanta**



Situation

The Farmworker Association of Florida (FWAF) began in 1983 and was incorporated in 1986. It is a state-wide, grassroots membership organisation of more than 10,000 agricultural worker families from predominantly Mexican, Haitian, African-American, Guatemalan, Honduran, and Salvadoran communities. FWAF members work mainly in the fern, foliage, citrus, vegetable, sod, mushroom, and landscaping industries.

Since the early 1990s, the FWAF has addressed pesticide exposure, field sanitation, and other agricultural health and safety issues by educating agricultural workers about occupational exposure protection measures. The organisation works across 15 counties in the state, including the target community for this project that members of RCE Greater Atlanta undertook.

Impact

With successive years of record-breaking Summer heat, excessive heat is increasingly becoming a global public health priority. It will be the most vulnerable populations who are the most adversely affected by this excessive heat, and it is these populations that have the least amount of control over their work environments. Within the United States, heat illness prevention training and workplace measures to protect workers from heat hazards need to be prioritised in light of a changing climate. To advance sustainable development, interventions and policy are both needed to ensure safe work environments for agricultural workers.

Responses/Actions Taken

The objectives for the Girasoles project included: (1) describing heat hazards and associated heat-related health problems faced by agricultural workers; (2) translating these research findings into work-centred heat illness prevention trainings and interventions, and; (3) disseminating the research findings to workers, employers, key stakeholders, and the public to mobilise efforts in the face of rising temperatures. Members of RCE Greater Atlanta utilised community-based research, community engagement through promoters, and physiologic bio-monitoring to carry out the research. Heat illness prevention trainings were then developed from the research findings, which were then carried out by farmworkers, advocates, and community health workers. Finally, [a short film](#) was created with a media collaborator to further disseminate findings to a larger audience.

Research Coordinator for the Farmworker Association of Florida (FWAF), Nezahualcoyotl Xiuhtecutili, MA, speaking with study participants at a local farm.



Valerie Mac, PhD, RN, FNP-C, ENP-C



Valerie Mac, PhD, RN, FNP-C, ENP-C

Emory University and FWA staff members Estefani Ignacio Gallegos, BS and Stefka Mentor, MSN, AGNP-BC analysing participant samples for dehydration.

Results

Participants were monitored using a comprehensive bio-monitoring protocol for up to three workdays. It was found that participants exceeded the recommended core body temperature (Tc) over 75% of observed workdays. In an analysis of a sub-sample of the workers, ~53% were dehydrated pre-shift, and 81% were dehydrated post-shift, with 33%

of the workers having acute kidney injury (AKI) on at least one workday. The odds of an AKI increased 47% for each 5-degree C increase in the heat index. These results provided the evidence for the necessary heat-adaptive interventions to address heat hazards faced by agricultural workers in the changing climate.

Tips to Tackle Climate Action

⚙️ What You Can Do:

Take stock of the agricultural sectors in your own region – determine if associations or industries are offering training on how to prevent heat illness in agricultural workforces and work with partners to create curriculum and health monitoring if they are not. In addition, seek out scientific and community partners who can work together to design and implement policy that mandates training and heat-adaptive interventions to protect workers from the heat.

Reach out to community supporters like community-based advocacy organisations as well as agricultural extension centres and their agents to bring employers and community organisations to the table to strategise together. Finally, engage media experts and visual artists to support awareness and action for workers facing public health threats.

⚠️ Why It Matters:

Workforce sectors need to adapt to the realities of a warmer and wetter climate to protect workers from illness, especially those in the agricultural and food sectors. Training for adaptation must be paired with education on mitigation for these sectors.

📄 More Information:

- 🔗 [Hydration Status, Kidney Function, and Kidney Injury in Florida Agricultural Workers](#)
- 🔗 [Heat Exposure in Central Florida Fernery Workers: Results of a Feasibility Study](#)
- 🔗 [Farmworker Vulnerability to Heat Hazards: A Conceptual Framework](#)
- 🔗 [Novel Analytic Methods Needed for Real-Time Continuous Core Body Temperature Data](#)

👥 Who to Involve:

Make sure agricultural workers receive training in field and are active stakeholders in design and implementation of heat illness prevention training. Work with medical experts who can help create safety criteria as well as translators for any written or oral communication that is needed for different language groups.

Funding information:

The Girasoles (Sunflower) Study (R01-OH01657)

For further information:

Linda McCauley, PhD, RN, FAAN, FAAOHN
linda.mccauley@emory.edu
 Roxana Chicas, PhD, RN
rchicas@emory.edu





Next Steps

Dr. Philip Vaughter, Research Fellow, UNU-IAS

Where do we go from here? The field of climate change education is still relatively new, and in turn new pedagogies, curriculums, and modalities of learning will undoubtedly unfold within it over the coming years as global society continues to address the challenges of climate change. The projects showcased here represent some of the innovative approaches communities have taken to address action through climate education in light of their own emissions sources, vulnerabilities, and partnerships. But these initiatives are just the beginning – with a problem as complex and multi-faceted as climate change, what other avenues of teaching and learning can play a role in finding solutions?

During the first five years of the United Nations' Sustainable Development Goals (SDGs), RCEs worked on ESD projects that linked a multitude of the SDGs to climate change education. This was an important step forward for ESD in general, but for climate change education in particular. In the years leading up to the launch of the SDGs, climate change education projects within the network tended to take a siloed approach towards climate action, framing education for climate change as separate or even competing with other sustainable development challenges. But from 2015 onwards, climate education projects begin emphasising synergy and complementarity with other sustainable development challenges such as poverty, disaster risk reduction, and public health among RCEs.

Since its inception in 2005, a topic in sustainable development that is increasingly combined with climate change education among RCE initiatives is education on biodiversity conservation. The ongoing climate crisis and extinction crisis no doubt share similar origins, such as rapid land-use change, rapid resource consumption, and changing weather patterns. Increasingly, educators are showing that they can also share similar solutions. As showcased by the project from RCE Greater Eastern Uganda in this publication, teaching communities to conserve local biodiversity can also reduce greenhouse gas emissions. Learning how to use natural resources less intensively and to diversify livelihoods can not only protect local species, but also locks in more carbon as plant material in healthy ecosystems. The role of adaptation will also be a necessary component for education projects that seek to combine learning for action on climate change and biodiversity conservation. Learners will need to take into account the changes already taking place in the climate in order to enact effective conservation strategies, as well as the complex interplay between organic and inorganic material in the global biogeochemical cycle to more effectively reduce emissions.

Perhaps the most important next step that is needed in the merging of education on climate change and biodiversity conservation is the need for nuance and contextualised approaches when creating actions as learning outcomes. Great enthusiasm has been expressed by policymakers, private sector actors, and publics about tree plantings. This is potentially a big win-win scenario for both addressing climate change and conserving the natural world, but educational approaches will need to be crafted carefully to harness this enthusiasm while instructing these actors which type of tree species should be planted where. Rushing headlong into education and training programmes on plantation forestry will do little to solve either crisis if the given environment cannot support the species planted, the species planted

is a non-native species which are insufficient at absorbing as much carbon as the pre-existing landscape of native species, or the plantation is a monoculture that leaves little in the way of local biodiversity intact. Any education initiative that seeks to simultaneously tackle climate change and biodiversity loss will need to tailor actionable outcomes to fit within local ecosystems and protect native species if they are to be successful.

Another way forward for action through climate change education may be through our meals. The subject of food security is seen paired with many RCE projects on climate change education, and offers a topic for engagement that is both broad and universal. After all, everyone has to eat, and what we eat is not only affected by the climate, but can indeed shape the climate. As evidenced by RCE Crete's project, agricultural systems are under increasing stress as a changing climate often means unstable weather patterns and intermittent water supplies. Agricultural extension services will in turn need to adapt to teach farmers to adapt to these changes, such as through the introduction of crops and livestock or new planting and harvesting techniques. Additionally, agricultural workers will themselves need to adapt to changing climatic conditions, as demonstrated in RCE Greater Atlanta's project. Furthermore, education linking food and climate cannot be applied only to the supply side of the agricultural sector. Both policy makers and consumer publics will also need to be educated about the changing reality of food demand in a changing climate. Policy makers will need to learn that agricultural subsidies that worked in the 20th century may be unworkable in the 21st century. Public appetites for climate-sensitive crops or for agricultural products that are too carbon intensive will need to be tempered with public awareness campaigns and community education interventions.

Education initiatives that link climate change and food security to sustainable consumption

patterns have a critical role to play in education on climate action. While many so called 'food mileage' awareness programmes from the early 2000s were unsuccessful because these early initiatives failed to take into account the greenhouse gas emissions embedded into the production cycle of a given agricultural product, the idea of linking food to education initiatives on climate change remains a compelling one. Because food production systems emit different greenhouse gases at different points in the production cycle – such as fertiliser usage, land-use change, and transit emissions in bringing a product to market – more nuanced education on how to assess food's contribution to climate change is needed. It is important consumers learn how to assess their meals' total carbon footprint. Education and public awareness activities have an important role to play in modifying consumer behaviour over the long term. Clearly the interest in food as it relates to climate change is present among educators within the RCE network, and new projects highlighting the synergy between these two topics are being created every year.

While initiatives that combine education on climate change with education on other issues within sustainable development are certainly a growing trend among RCE projects, there may be an upward limit to how many issues can be added into a curriculum on climate change before the curriculum forsakes action-oriented outcomes to respond to climate change for the sake of the awareness-raising necessary to understand a growing number of issues added to a curriculum. Any educator will tell you any given curriculum must contend with breadth vs. depth in its focus. This tension between breadth and depth is also observable among RCE projects on climate change education. RCE projects on climate change education which relate one or two other topics on sustainable development to climate change by and large cumulate in actionable outcomes, whereby the learners are taught actions to address climate change and implement these actions, often with the added benefit of the

action simultaneously addressing the other topics integrated into the curriculum. However, RCE projects on climate change education that integrate three or more additional topics on sustainable development into a curriculum tend to have fewer actionable outcomes, as more of the curriculum is devoted to raising awareness among the learners on the other topics as opposed to practicing action competence on solutions to climate change. This is not to say raising awareness is unimportant – it is critical. Nor is it to say that curriculum on climate change that combines multiple topics in sustainable development cannot result in concrete actions. Rather, it is offered as a consideration to keep in mind as educators design curriculums, taking into account learners' limited time as well as the intention of the education – in this case whether it is about climate change (awareness-raising) or for responding to climate change (action competence).

New ways forward for climate change education may not only involve synergising with a variety of other sustainable development agendas, but also re-examining who needs to be educated. All of the projects within this collection showcase the RCE model of combining formal and non-formal education to reach both students within schools and community members at large. The need to engage with the general public is perhaps especially salient for education on climate change, as students in schools are often not the ones making the decisions that contribute to the most greenhouse gas emissions. To reach adult learners outside of classrooms through non-formal education, the future may be best envisioned by looking towards the past. During the 1970s and 1980s, both governments and civil society organisations around the world created public awareness campaigns around a variety of environmental issues such as acid rain, deforestation, and ozone depletion. These public awareness campaigns not only informed citizens about the nature of the problem, but were usually joined with recommendations for actions that could be undertaken to contribute to



Mathias Bach Laursen | Unsplash

a solution. While many of the environmental issues dealt with in previous decades were not as complex as climate change (often with single sources of a given problem from a few given economic sectors), as has been illustrated by the RCE projects here, approaches to climate change education can be made more manageable by taking into account local emissions profiles, which in turn inform optimal mitigation strategies for given cities, communities, or sectors of the workforce. With their multi-stakeholder approach to education, RCEs are in a prime position to revive these learning strategies for 21st century modalities.

In addition to engaging with the public at large, it will be vital for education on climate change to engage with workforces through iterative training. Much of what exists in regards to action competence for climate change education is targeted at the individual or household consumer level. However, businesses and their constituent workforces will also need to learn how to operate in a changing climate, mitigating emissions where possible and adapting to the changes already locked in from historical emissions. Oftentimes, workforce training is considered a one-time investment by an employer into an employee as they onboard in their new job. However, when it comes to climate change, workforce trainings will likely need to be iterative throughout an employee's career in a given economic sector, and as new climatic scenarios unfold and new technologies for mitigation and adaptation become available, training will have to be updated for all employees regularly. The projects showcased by

RCE Denmark, RCE Dar es Salaam, and RCE Greater Atlanta all highlight critical reasons for engaging with workforce training from the beginning of career through retirement, but such initiatives designed to train workforces are rare within climate change education. What is needed is more of such education ideas on how to not only make our homes more sustainable, but our jobs as well.

Whatever lies ahead in the field of climate change education, one thing is imminently clear, and that is the need to move beyond knowledge into actions that respond to the new reality of climate change. A student's ability to list which greenhouse gases contribute to climate change may be a first step, but it can hardly be the last if most of a society is aware of the fact but continues to emit the pollutants. Modern pedagogies for dealing with climate education should move beyond analysis paralysis, and make sure to couple knowledge on climate change with actionable behaviours that be taken by students, workforces, and communities at large in responding to the climate crisis. The RCE projects presented here are a first step towards doing that. The educators whose projects are featured here had to step outside of their comfort zone of facilitating knowledge transfer and into the role of change agents. The learners who participated in the project also had to step outside their comfort zones and examine not only their own knowledge but their own behaviours. None of this is easy, but all of it is essential if we are to move beyond just the ability to comprehend a crisis as large scale as the climate crisis towards actually solving it.

List of Abbreviations

ACE	Action for Climate Empowerment	MPS	Malaysian Primatological Society
AIGA	Alternative Income Generating Activities	MPSP	Seberang Perai Municipal Council
AKI	Acute Kidney Injury	NDC	Nationally Determined Contribution
CAP	Consumers Association of Penang	NEMA	National Environment Management Authority
CBO	Community-Based Organisation	NGO	Non-Governmental Organisation
CCSAFS	Climate Change, Sustainable Agriculture, and Food Security	NPO	Non-Profit Organisation
CFR	Central Forest Reserve	PADF	Pan American Development Foundation
DEG	Danske Erhvervsskoler og – Gymnasier	PAN-AP	Pesticide Action Network Asia-Pacific
ENVIS	Environment Information System	PGC	Penang Green Council
EPUC	Erhvervspædagogisk Udviklingscenter	RCE	Regional Centre of Expertise on Education for Sustainable Development
ESD	Education for Sustainable Development	RSY	RCE Sejahtera Youth
FSC	Forest Stewardship Council	SAM	Sahabat Alam Malaysia
FWAF	Farmworker Association of Florida	SDGs	Sustainable Development Goals
GAP	Global Action Programme (on Education for Sustainable Development)	SLOSS	Single Large Or Several Small
GCS	Gibbon Conservation Society	SUARAM	Suara Rakyat Malaysia
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH	SWOT	Strengths, Weaknesses, Opportunities and Threats
GPS	Global Positioning System	TeRRIFICA	Territorial Responsible Research and Innovation Fostering Innovative Climate Action
GRASS	Pertubuhan Alam Sekitar Sejahtera Malaysia	TVET	Technical and Vocational Education and Training
ICT	Information Communication Technology	TWN	Third World Network
IT	Information Technology	UNESCO	United Nations Educational, Scientific and Cultural Organization
IUCN	International Union for Conservation of Nature	UNFCCC	United Nations Framework Convention on Climate Change
JAMSTEC	Japan Agency for Marine-Earth Science and Technology	UNU-IAS	United Nations University Institute for the Advanced Study of Sustainability
KAMY	Klimat Action Malaysia	USM	Universiti Sains Malaysia
KAUM	Klimat Action Utara Malaysia	VR	Virtual Reality
KUASA	Persatuan Aktivis Sahabat Alam	WWF	World Wildlife Fund
MOOC	Massive Open Online Course		

GAP Priority Action Areas

Priority Action Area 1	Advancing policy
Priority Action Area 2	Transforming learning and training environments
Priority Action Area 3	Building capacities of educators and trainers
Priority Action Area 4	Empowering and mobilizing youth
Priority Action Area 5	Accelerating sustainable solutions at local level

References

FOREWORD

Climate Education (Fleur Newman and Hyunjin Chang, Action for Climate Empowerment (ACE) Team, United Nations Framework Convention on Climate Change (UNFCCC))

United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nations Framework Convention on Climate Change (UNFCCC). 2016. Action for Climate Empowerment: Guidelines for accelerating solutions through education, training and awareness-raising. Retrieved in February 2021 from https://unfccc.int/files/cooperation_and_support/education_and_outreach/application/pdf/action_for_climate_empowerment_guidelines.pdf

United Nations Educational, Scientific and Cultural Organization (UNESCO). 2020. Integrating Action for Climate Empowerment into Nationally Determined Contributions: A short guide for countries. Retrieved in February 2021 from https://unfccc.int/sites/default/files/resource/Guide_Integrating%20ACE%20into%20NDCs.pdf

EDITORIAL

Innovating for Action: Addressing Climate Change through Education

(Dr. Philip Vaughter, Research Fellow, UNU-IAS)

Rogers, Kerrylee, Jeffrey J. Kelleway, Neil Saintilan, J. Patrick Megonigal, Janine B. Adams, James R. Holmquist, Meng Lu, Lisa Schile-Beers, Atun Zawadzki, Debashish Mazumder, and Colin D. Woodroffe. (2019). Wetland Carbon Storage Controlled by Millennial-scale Variation in Relative Sea-level Rise. *Nature*, 567(7746), 91–95.

Thunberg, Greta. 2018. The Disarming Case to Act Right Now on Climate Change. Retrieved in October 2020 from https://www.ted.com/talks/greta_thunberg_the_disarming_case_to_act_right_now_on_climate_change

United Nations Framework Convention on Climate Change (UNFCCC). (n.d.). Retrieved in October 2020 from <https://unfccc.int/topics/education-youth/the-big-picture/what-is-action-for-climate-empowerment#eq-1>

ASIA-PACIFIC

Let's Tackle Global Warming! Virtual Museum of Science Experience (RCE Okayama)

Ka, Won-iru, and Masaharu Inada. 2014. 大気中の二酸化炭素濃度の動態に関する研究(降雨の影響) [Study on the Dynamics of Carbon Dioxide Concentration in the Atmosphere (Effects of Rainfall), Buds of Science Prize, University of Tsukuba]. Retrieved on 14 August, 2020 from <https://www.tsukuba.ac.jp/community/kagakunome/pdf/14/jr/jrhs5.pdf>

Okayama City. 2019. 岡山市環境保全行動計画(第三期)【岡山市地球温暖化対策実行計画(事務事業編)】 [Okayama City Environmental Conservation Action Plan (3rd period) (Okayama City Global Warming Measure Implementation Plan)]. Retrieved on 14 August, 2020 from <https://www.city.okayama.jp/kurashi/cmsfiles/contents/0000016/16116/000374720.pdf>

Awareness and Education on Climate Change: A Day for Climate (RCE Penang)

OECD. 2018. Climate-resilient Infrastructure – Policy Perspectives. OECD Environment Policy Paper no. 14.

Sub-National Actions for Climate Resilient Sustainable Development in Punjab, India (RCE Chandigarh)

Punjab Economic Survey. 2019-2020. Economic & Statistical Organization, Government of Punjab, India.

AFRICA

Stakeholder Engagement for Promoting Community Resilience to Climate Change (RCE Greater Eastern Uganda)

Forest Stewardship Council (FSC). 2018. The FSC National Stewardship Standard of the Republic of Uganda.

National Environment Management Authority (NEMA). 2011. Contribution of the Forestry Sub-sector to the National Economy: The Economic Value of Forest Resources of Uganda.

World Bank. 1993. Ecologically Sensitive Sites in Africa. Volume II: Eastern Africa. Compiled by the World Conservation Monitoring Centre for the World Bank, Washington, DC, USA.

EUROPE

Territorial Responsible Research and Innovation Fostering Innovative Climate Action: The Belarusian Experience (RCE Belarus)

United Nations Climate Change. (n.d.). What Do Adaptation to Climate Change and Climate Resilience Mean? Retrieved on 3 October, 2020 from <https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/what-do-adaptation-to-climate-change-and-climate-resilience-mean>

United Nations Department of Economic and Social Affairs (UN DESA), Population Division. 2019. World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420). New York: United Nations. Retrieved on 2 October, 2020 from Publications on <https://esa.un.org/unpd/wup/>

Integrating SDGs into an MSc for Climate Change, Sustainable Agriculture, and Food Security (RCE Crete)

Makrakis, Vassilios, and Nelly Kostoulas-Makrakis. 2020. Developing an MSc in Climate Change, Sustainable Agriculture and Food Security. <http://www.ccsafs.edc.uoc.gr/>

Vocational Training in Wood as an Element of Sustainable Construction Methods (RCE Denmark)

Aalborg University. 2020. Ny rapport viser store forskelle på CO₂-belastningen ved nybyggeri [New Report Shows Large Differences in the CO₂ Load of New Construction]. Retrieved from <https://via.ritzau.dk/pressemeddelelse/ny-rapport-viser-store-forskelle-pa-co2-belastningen-ved-nybyggeri?publsherId=8155951&releasId=13589935>

Christensen, Malte A. 2019. Vi skal genbruge mere i byggeriet – for klimaets skyld [We Need to Recycle More in Construction – For the Sake of the Climate]. Videncentret Bolius. Retrieved from <https://www.bolius.dk/vi-skal-genbruge-mere-i-byggeriet-for-klimaets-skyld-89086>

Danish Ministry of Climate, Energy and Utilities. 2019. Denmark's Integrated National Energy and Climate Plan. Retrieved from https://ens.dk/sites/ens.dk/files/EnergiKlimapolitik/denmarks_national_energy_and_climate_plan.pdf

Træ Information. (n.d.). Træ og miljø [Wood and Environment]. Retrieved from <https://www.traeinfo.dk/baeredygtighed/trae-og-miljoe/>

AMERICAS

Landslide Risk Assessment in Saint Vincent and the Grenadines (RCE Grand Rapids)

Food and Agriculture Organization of the United Nations. 2013. Climate-Smart Agriculture Sourcebook.

Rodrigues, Marco, Gerald Meier, Bishwa Pandey, Justin Locke, J. and Keren Charles. 2014. Rapid Damage and Loss Assessment (DaLA): December 24-25, 2013 floods – a report by the Government of Saint Vincent and the Grenadines. The World Bank. 1–24. Retrieved from <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/213861468302688159/rapid-damage-and-loss-assessment-dala-december-24-25-2013-floods-a-report-by-the-government-of-saint-vincent-and-the-grenadines>

Simpson, M. C. et al. 2012. The CARIBSAVE Climate Change Risk Atlas (CCCRA) - Saint Vincent and the Grenadines. DFID, AusAID and the CARIBSAVE Partnership.

Authors

FOREWORD

Climate Education

Fleur Newman & Hyunjin Chang, ACE Team, UNFCCC

EDITORIAL

Innovating for Action: Addressing Climate Change through Education

Philip Vaughtner, UNU-IAS

ASIA-PACIFIC

Let's Tackle Global Warming! Virtual Museum of Science Experience (RCE Okayama)

Tomoyo Kurozumi, RCE Okayama

Awareness and Education on Climate Change: A Day for Climate (RCE Penang)

Nurul Salmi Abdul Latip, Munirah Ghazali, Mohammad Zohir Ahmad and Wan Sharipahmira Wan Mohd Zain, RCE Penang

Sub-National Actions for Climate Resilient Sustainable Development in Punjab, India (RCE Chandigarh)

J. K. Arora, S. S. Ladhar & Ravleen Singh, RCE Chandigarh

AFRICA

Solid Waste Management Options for Food Security, Energy & Climate Change Mitigation (RCE North Rift)

Muguro David Ngige, RCE North Rift

Managing Biodiversity in a Changing Climate in the Albertine Rift Countries (RCE Dar es Salaam)

Elikana Kalumanga, RCE Dar es Salaam

Stakeholder Engagement for Promoting Community Resilience to Climate Change (RCE Greater Eastern Uganda)

Andama Edward & Oyege Ivan, RCE Greater Eastern Uganda

EUROPE

Territorial Responsible Research and Innovation Fostering Innovative Climate Action: The Belarusian Experience (RCE Belarus)

Kate Sposab, RCE Belarus

Integrating SDGs in the MSc for Climate Change, Sustainable Agriculture, and Food Security (CCSAFS) Program (RCE Crete)

Vassilios Makrakis, RCE Crete

Vocational Training in Wood as an Element of Sustainable Construction Methods (RCE Denmark)

David Rangan & Trine Alette Pantan, RCE Denmark

AMERICAS

How Urban Youth Can Be an Engine to Achieve Low-Carbon Sustainable Lifestyles: Beginning in Bogota (RCE Bogota)

Diana Páez & Marcela Rodriguez Beltran, RCE Bogota

Landslide Risk Assessment in St. Vincent and the Grenadines (RCE Grand Rapids)

Erik Nordman, RCE Grand Rapids

The Girasoles Project (RCE Greater Atlanta)

Valerie Mac, Daniel Smith, Vicki Hertzberg, and Linda McCauley, RCE Greater Atlanta

NEXT STEPS

Philip Vaughtner, UNU-IAS

For more information about RCEs, the projects within this publication, or how to become a member, please contact the Global RCE Service Centre, Education for Sustainable Development Project, UNU-IAS, rceservicecentre@unu.edu.

irobi, Kenya / Jordan / Kakamega-Western Kenya / Ka
geria / Khomas-Erongo, Namibia / KwaZulu Natal, South
a / Lagos, Nigeria / Lesotho / Makona & Rural Eastern Ca
uth Africa / Maricao, Puerto Rico / Mau Ecosystem Co
ex, Kenya / Momba, Uganda / Namibia / Swaziland / Zon
 / Bogotá, Colombia / Bogotá-Columbia (North Ca
 / Canada / Chaco, Argentina / Curitiba-Parana, Bra
 / USA, Greater Sudbury, Canada / Cusco, Pe
 / Cuzco, Peru / Montreal, Canada / North Texas, USA
 / Rio de Janeiro, Brazil / Saskatchewan, Canada
 / Ontario, Canada / Western Sahara, SA
 / Jammu & Kashmir, Jharkhand Pradesh, India / Sanggahungu
 / Bogor, Indonesia / Bohol, Philippines / Ce
 / Philippines / Chiam, Thailand / Chandigarh, India / Chi
 / Delhi, India / East Kalimantan, Indonesia / Gungah
 / Australia / Goa, India / Greater Dhaka, Bangladesh / Gre
 / Phnom Penh, Cambodia / Greater Sendai, Japan / Greater
 / Sydney, Australia / Guwahati, India / Hyogo-Kobe, Ja
 / Cocos, Philippines / Incheon, Republic of Korea / Kitakyu
 / Japan / Kodagu, India / Kyrgyzstan / Lucknow, India / M
 / Delhi, India / Northern Mindanao, Philippines / Okayama,
 / Japan / Pacific Island Countries / Penang, Malaysia / Pune,
 / India / Shangri-la, China / Southern Vietnam / Srinagar, Ind
 / Gyeong, Republic of Korea / Trang, Thailand / Ulju, Re
 / Republic of Korea / Western Australia / Yogyakarta, Indonesia /
 / Fukuoka, Japan / Açores, Portugal / Barcelona, Spain / Cen
 / Greece / Creias-Oeste, Portugal / Crete, Gree
 / East Midlands, UK / Espoo, Finland / Graz-Sty
 / Austria / Hamburg, Germany / Ireland / London, UK / Mus

