



Pesticides and chemical fertilizer free village Kushadevi, Kavre

Proceedings: Graduates' Workshop on Green Economy

28 July 2013, Kathmandu, Nepal

Background

Green economy results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities (UNEP, 2010). In its simplest expression, green economy is a low-carbon, resource efficient and socially inclusive system. In a green economy, growth in income and employment are driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. The present scenario of disorganized developmental processes and the unmanaged urbanization, especially in developing countries, have brought a transitional phase, which needs to be addressed by the different aspects of green growth worldwide. The Small Earth Nepal (SEN), in collaboration with the Consortium for Capacity Building (CCB) at the University of Colorado at Boulder, USA and with the support of the Asia-Pacific Network for Global Change Research (APN), and technical assistance from the Central Department of Environmental Science (CDES), Tribhuvan University and the Agriculture and Forest University (AFU) in Nepal organized a national-level program entitled the "Graduates' Workshop on Green Economy" in Kathmandu, Nepal on 28 July 2013. The workshop provided a platform to early career researchers to present their research findings and share their work to the scientific community, academicians and their colleagues. The workshop included keynote speeches, paper presentations, as well as poster presentations. A panel discussion was also organized to address the emerging issues of green economy and the role of young researchers on addressing those issues.

The Small Earth Nepal (SEN) was awarded with a project from APN under its CAPaBLE program to conduct the workshop and other activities in the Asia Pacific region.

INAUGURATION SESSION

- **Session Chair:** Prof. Suresh Raj Chalise, Advisor, The Small Earth Nepal (SEN)
- **Chief Guest:** Mr. Gokarna Mani Duwadee, National Focal Point (nFP)-APN and Joint Secretary-Ministry of Science, Technology and Environment (MoSTE), the Government of Nepal

KEYNOTE SPEECH

Mr. Gregory Pierce, Senior Associate Scientist, CCB

Mr. Pierce elaborated on structural solutions for natural hazards over what has become the orthodoxy in disaster studies. Over the decades, terms like “vulnerability”, ‘resilience’, and ‘risk’ have taken on very specific, even jargonistic meanings in the subject. Indeed, this forty-year history of the ascendance of critical disaster studies and especially of its linguistic framework has constituted something akin to a Kuhnian paradigm shift within the broad field of disaster studies. Mr. Pierce stressed on the word “hard/pseudo-hard” science as he believed that the vast majority of professionals entering into disaster research and practice have continued to come from “hard” physical and engineering sciences or “pseudo-hard” economics backgrounds. He complained that the current scientific method of conceptual reduction and abstraction with their own scientific community and framework insulates it from other critical components that are important in a green economy. He urged the youth to be aware of the history and Shangri-la effect. He said everything has culture and history shows where the power comes from and who yield it. So it is very important to question history. He also criticized the report of the United Nations Environment Programme (UNEP) where it explains about the green economy for the least developed countries. He said we don’t live in one dimension, we live in four dimensions as well and as we also don’t live in a fantasy world but a real one and thus, when writing, we need to consider the real world. Finally, he urged youth to be role-models by applying what they have learnt and implementing it in practice and research.



Mr. Gregory Pierce

Mr. Gokarna Mani Duwadee

Prof. Suresh Raj Chalise

Mr. Gokarna Mani Duwadee, Joint Secretary, MoSTE, and nFP, APN

With an overview on Rio+20, Mr. Duwadee said sustainable future is possible when the three pillars are equally strong: environmental, social and economic. Stressing on UNEP’s definition of the green economy, he emphasized on the need of rethinking over the changes in and sources of growth and development. He also shared that the Ministry of Science, Technology and Environment (MoSTE) has been working on the green economy sector and has been formulating different policies and programs. It has been also promoting green investment. He stressed that young people have major responsibilities who need capacity building in climate change, environment and green economy in different ways. He informed that youth are paying more attentions to such environmental problems and its solution as the ministry has been achieving numerous proposals, plans and suggestion regarding the issues. Last but not the least; he said the government was committed to partnership and work with the young people.

Prof. Suresh Raj Chalise, Advisor, SEN

Prof. Chalise focused on biasness in research and research output and reflected on the changes, which come up with the introduction of new “buzz words” every ten years. He envisioned the knowledge was constantly growing and that each branch of knowledge was contributing to other branches of knowledge. Green Economy and Sustainable development are two examples of such buzz words whose meanings can be debatable. He stressed on the need of young researchers to debate and not to accept history as the final word. He emphasized the traditional ways on how Nepalese have been discovering and practicing green economy, with changes in the last fifty years due to technological changes. Although everyone in Nepal was engaged in agriculture in the past, people are rapidly abandoning it now. Agriculture practitioners have become limited to old women and young children in most of the rural places due to abroad migration. Science doesn't have the answer to everything but it can provide solutions to mitigate some problems. Prof. Chalise persuaded the developing world that the buzz words should come from within and of our own experiences rather than some external entity who have defined it for us.

TECHNICAL SESSION I



AGRICULTURE, FORESTRY AND BIODIVERSITY

- **Session chair:** Prof. Dr. Nabaraj Devkota, Research Director, Agriculture and Forestry University (AFU), Nepal
- **Co-chair:** Mr. Jeeban Panthi, Research Coordinator, SEN

Human urine: A sustainable alternative source of fertilizer

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Chemical fertilizers are widely used to increase agriculture production in order to combat increasing challenges in meeting the demand for food around the world. But, the chemical fertilizers are expensive and their prices keep increasing. Poor farmers often cannot afford chemical fertilizers and are not easily available in the remote and hilly parts of Nepal at the required time, place and quantity. In spite of this fact, Nepal is spending billions of rupees every year to import chemical fertilizers from other countries. Human urine, a biological plant nutrient rich fertilizer, is easily available and could be a viable alternative to chemical fertilizers for sustained crop production. At the same time, use of human urine in crop production not only provides valuable fertilizers but also reduces the impact on environment and the water bodies if properly managed. A research was conducted on commonly grown vegetable, sweet pepper (*Capsicum annuum* L.) to evaluate the fertilizer value of human urine in different combinations and to compare the value with compost, urea and their combinations based on plant performance. The experiment was done using Randomized Complete Block Design consisting of eight treatments, each replicated thrice. Each treatment was fixed to a supply of 100 kilograms of nitrogen per hectare. The highest plant height (54.7 centimeter), number of fruit per plant (9.1), and fruit yield per plant (553.9 gram per plant) were recorded with the treatment fertilized with human urine in combination with compost. Plants fertilized with the combination of human urine and compost showed better growth and yield compared to the application of chemical fertilizer alone. The results indicated that the human urine performs better when used in combination with compost, and can be used as a promising fertilizer source as revealed in the case of sweet pepper production.

Impact assessment of climate change on parasitic and vector borne diseases in livestock and human in buffer zones area of Chitwan National Park, Nepal

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Raising livestock, a major economic and social activity in Nepal, is providing a source of livelihood and social benefit to the people. Livestock productivity is largely influenced by the level of nutrition derived from natural grazing, water availability, and health status of the animals. Climate change is disrupting natural ecosystems by providing more suitable environments for infectious diseases into new areas where they may harm wild life, domestic species, as well as humans. The increased incidence in infectious diseases in wildlife, livestock, and people may be one of the important immediate on sequences of global warming. Nepal is already subject to an enormous number of animal diseases; the burden will further grow with the increased incidences of existing or newly emerging diseases that are difficult to predict. A study was conducted to understand climate change and its impact on livestock and human health particularly on parasitic and KAP (knowledge, attitude and practice) study on vector borne diseases (Dengue, Malaria and Japanese Encephalitis). The study was conducted at Gitanagar, Padampur, and Patihani areas of Chitwan district from April to December, 2012. Primary data were collected through a number of participatory appraisal tools - focus group discussion, key informant interview and household surveys. A total of 150 households were selected for the study. Findings revealed that only 22% respondents were aware about climate change "*Jalabayu Paribartan*" whereas 78% were unaware about this information. About 36% respondents are taking some adaptive measures to reducing the adverse effects of changing climate in their livestock. Similarly, most of livestock farmers felt that flies and tick were the major vectors of diseases. The main climatic factors that are affecting the livestock production were vector borne diseases, infectious diseases, parasites, and insufficiency of feed and forage. Among these factors, disease and parasitic infections were more important for decreasing livestock production. The main problem in livestock health was considered as *Fasciola sps*. Only 34% people are using bed nets as preventive measure for vector borne diseases, where as 49%, 31% and 43% people knew about mosquitoes are vectors responsible for the transmission of Dengue, Malaria and Japanese encephalitis respectively. Observed thirty year (1981-2011) annual temperature and rainfall data showed slightly rising in temperature and more erratic rainfall in Chitwan district. In conclusion, there is less understanding of impact of climate change and its impact on livestock.

Prospective of Nepalese youth on future of food

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Nepalese agriculture is typically characterized by small holder, traditional and subsistence in nature but it is enormously rich in terms of biodiversity and natural resources, and plays a very important role in the country's economy. Nepal is also very rich in youth population as it makes up 40% percent of the total population and many of them are unemployed or underemployed. There is a decreasing interest among people of this generation in traditional and subsistence agriculture as well as in adapting to new changing socio-economic and climatic conditions. Yet the resulting questions are obvious: who will feed the future generations, and who will help manage our natural resources? Understanding the needs and aspirations of this young population is an important factor for spreading new habits, raising awareness and advocating for changes, and their different perspective, vision and motivation can contribute to practical solutions. Keeping these possibilities in mind, to meet food for growing population of present and future, food security considerations could be used majorly with sustainable agricultural practices of change in food habit, crop promotional based on pocket areas, sustainable crop management practices and participatory varietal development approach which could include youth as well as components of adaption on climate change in agriculture. Using change in food habit concept will help to focus on food diversification with well processing technologies to produce nutritious value added products where youth can be directly involved in raising awareness and engage in such type of agri-production. Likewise, product diversification and proper marketing may add pertinent areas in meeting the goals. Demand based pocket area production could be another way to make agriculture more profitable. Leasehold farming will be better to commercial and competitive agriculture which creates employment opportunities considering sustainable soil management practices. Similarly traditional knowledge/practices

and conservation of local genetic resources may play key roles in farmers' and community's capacities to adapt to climate change to increase food production. Another important approach is organic agriculture, which is not only associated with local and national markets but also with global markets. Thus, if visions of a future based on sustainable and inclusive agriculture are to be realized, and if young people are going to have a place in that future, these approaches have to be taken carefully while developing our national level programs and agendas for Nepal.

TECHNICAL SESSION II



WATER, CLIMATE ADAPTATION AND ENERGY

- **Session Chair:** Prof. Dr. Kedar Rijal, Head, Central Department of Environmental Science, Tribhuvan University (CDES/TU)
- **Co-Chair:** Mr. Piyush Dahal, Program Coordinator, SEN

Annapurna Dhaulagiri Community Trek - Some possibilities of ecotourism and learning

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Long-term climate is changing all over the world but in the Himalayas, it is changing in a faster rate than the world's average. The impacts of climate change are now becoming visible with detrimental impacts that are affecting the mountain communities, livelihood, tourism and economy in an immense way. The local people living in the mountain areas are coping with the problems caused by climate change in a traditional ways through their modest effort. Their effort is less effective in comparison to the impacts caused by global climate change and it needs further assistance through a global effort to make the mountain communities' climate resilient. Last year, the author spent more than three months traversing Nepal's harsh mountainous regions, taking stock of the life of vulnerable people and assessing the impacts of climate change. Along with Apa Sherpa, the 21st-time Everest summiteer, he completed a grueling 1,555 kilometers trekking, which took him to some of the highest Himalayan passes and acquainted him with diverse cultures, lifestyles and people. Now the author is into exploring information and service delivery systems at local levels, based on ecotourism. Fragile environments, rugged terrain, and low agricultural productivity in mountains are particularly affected by climate change in the Himalayas. But, the majestic beauty of nature has largely trickled down the impacts of such changes through tourism in mountain communities. Everest and Annapurna regions are famous trekking destinations for trekkers, mountaineers, climbers, researchers and others from all over the world. Most of the tourists come to Nepal to see the outrageous beauty of those regions. In Nepal, tourism may have played a significant role in poverty reduction, livelihood improvement and nature conservation, that makes the people living in that regions, climate resilient to the current climate changes and it's impacts.

Study on energy consumption pattern and GHGs emission: A case study in Belwa VDC, Parsa, Nepal

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The study was conducted in 2012 to know the energy consumption pattern and greenhouse gases (GHG) emission of Belwa Village Development Committee (VDC) of Parsa, Nepal. The major energy resources used in the study area were biomass based fuel, hydroelectricity, and petroleum products. Biomass based fuel such as fuel wood was used in large amount in spite of the problems associated with its use - including energy inefficiency, deforestation, increasing use of time for collection of fuel, increased indoor air pollution, and other deleterious health and environmental effects. Both primary and secondary data were used to assess the energy consumptions situation for the research purpose. Major findings revealed that more than 95% of the population in the VDC used firewood as a main source of fuel for cooking whereas almost all people have been using electricity for the lighting purpose. Among the total sampled households (104), 734.6 Tonnes per year of fuel wood, 50.6 Megawatt-hour per year of electricity, negligible amount of kerosene (3.248 Liters per year per household) was used. The total energy consumption among the survey households was 13968.7 Giga Joule per year with 18.2 Giga Joule per year per person. The total GHGs emission was 1161.7 tonnes of CO_{2eqv} year with per capita share of 1718.5 kilograms of CO_{2eqv} per year per person. Based on the findings, improved cooking stove (ICS) was recommended as the best alternative energy technology for the area. It will reduce 143.88 tonnes of CO_{2eqv} per year if all traditional cook stoves (TCS) are replaced by ICS. ICS is reported to be more efficient than TCS that could save fuel wood by 74.9 kilogram per month in the ICS installed house. There was a reduction of 43.5% in the amount of total suspended particle concentration compared to TCS using houses resulting in better indoor air quality and decreased rate of respiratory diseases observed in women and children. Therefore, use of ICS significantly reduced the indoor air pollution and the emission of greenhouse gases.

Changing trends of various population parameters in relation to climate change and its impact on people's livelihood in Dubiya VDC, Kaplivastu District

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Deterioration of climate sensitive ecosystem services such as agriculture, water resource, and forest affects the livelihood of people whereas limited livelihood opportunities and exposure to climate related hazard increase the vulnerability of population. A study was conducted in Dubiya Village Development Committee (VDC) of Kapilvastu where participatory tools such as household survey, focus group discussion, transect walk, and key informant interview were conducted besides a household survey with the use of limited and precise information related to the objective. The objective of the study was to assess the demographic status and document the perception of local people on climate change. The findings revealed that the problem of resource encroachment, deforestation, food availability and land fragmentation were associated to rapid population growth and high arrival of new settlers. Simultaneously local people have perceived change in temperature and precipitation pattern in the area. Erratic rainfall and other rainfall extreme events might have affected farming, degrading the livelihood of population. Agriculture was reported to be the most vulnerable sector affected by change in population dynamics and climate change with decreased productivity and increased incidences of disease, pest and weeds. The vulnerability of local people is enhanced by land fragmentation and distribution, large household size, and lack of income diversification, low education status, food insecurity and institutional constraints. It was noted that family planning, awareness on climate change and capacity building to diversify the livelihood source will help to strengthen the resilience of people. It was suggested by the respondents that mass migration is likely to occur in response to climatic variability that should be regarded as a legitimate response to the effects of climate change.

TECHNICAL SESSION III: POSTER PRESENTATION



Integrated farming systems: Key to agricultural sustainability in Eastern Mid-hills of Nepal

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A project on food security in Sankhuwasabha implemented by Rural Reconstruction Nepal (RRN) since 2011 has been strengthening the integrated agriculture system to enhance the local economy. Integrated Pest Management, Plant Clinic Tools, and Mono-culture, Mixed-cropping and Inter-cropping along with livestock and forests were the key components to motivate and convince the farmers for better production without the use of chemical fertilizers. The efforts has been made to use organic control measures, which are more effective and sustainable such as cow urine, "Banmaara" (*Lantana spp.*), "Titepati" (*Artemisia spp.*), wood-ash and tobacco powder per liquid.

Production of biodiesel from micro-algae

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A demonstration on 'Production of Biodiesel from Micro-algae' proved biodiesel to be more promising renewable bio-fuel in comparison to fossil fuel including diesel. Since, algae uses waste carbon dioxide, it helps to conserve environment and as a non-food source, it aids the value on food security. The possibility of algae biodiesel in Nepal is higher as Nepal is rich in water resources and there are hectares of barren land, which can be used to cultivate large amount of algae from which trillion liters of biodiesel can be produced that may resolve the ongoing fuel crisis and price hikes.

PANEL DISCUSSION



GREEN ECONOMY: CHALLENGES AND OPPORTUNITIES

- **Moderator:** Dr. Soni M. Pradhanang, City University of New York, USA
- **Panelists:** Saurav Dhakal, Christopher Butler, Shanker Adhikari, Suchita Shrestha

Saurav Dhakal: Climate change has had varied impacts on the community and they are coping with these changes largely in traditional ways and occasionally using the modern ways. Use of the poly-tunneling housing (greenhouse) for off season vegetable farming in Solukhumbu district, plantation of new cash crops cardamom and orange in Taplejung and Sankhuwasabha districts, and potato farming in cold regions of Dolakha and Gorkha stand out as some humble efforts of the local towards dealing with climate change. Cash crops (tea and cardamom), non-timber forest products have huge economic impacts in eastern region. Stories created in the camps will have close connection to the locations, people, their culture, their way of living and livelihood and facilities available there for travelers. Local foods, their identity and socio-economic

affairs related to the communities will also be part of the media contents. The main priority will be addressing the environmental problems of mountain regions. Our media output will try to reflect the general life in these communities in respect to the aforementioned issues. The ultimate goal is to create contents that help the communities, local journalists and entrepreneurs publicize the uniqueness and potentials of their place so that they can draw attention of stakeholders as well as tourists.

Christopher Butler: Since the mid-1990s, the World Bank had decided against funding large dams because of the social and environmental implications to the areas in which the dams were situated. But in April 2013, the World Bank changed its position, labeling large hydropower as “green” energy necessary to support the growth of developing countries like Nepal. It is apparent that dams are not completely “green.” Even in the best of situations, the installation of dams exacerbates erosion, impacts water flow and water quality, and can, in some cases, generate methane. On the other hand, compared to carbon-based fuels, hydropower is certainly greener and more desirable in terms of minimizing greenhouse gases. So, the “green” of hydropower depends largely on who you talk to. Environmentalists in Nepal would not consider hydropower to be green, while the private sector and the state endorse hydropower as green so as to take advantage of the wealth of renewable energy running down from the Himalayas.

Shankar Adhikari: About 1.6 million green jobs are available in Nepal which is 9.3% of the total employment figure in Nepal. Payment for Ecosystem Services (PES) and Reducing Emission from Deforestation and Forest Degradation (REDD) should be introduced in an effective and participatory way to promote green economy. Accounting values, addressing issues related to green economy is needed to be carried out in national and regional scale. If overall system is good then sub system will be good. Nepal is working with the overarching goal of forestry for prosperity. New Forestry sector strategy is also being prepared with major emphasis on Sustainable and scientific forest management, productivity enhancement, ensuring environmental goods and services and promoting good governance. Views from different sectors should have common issues and the cross cutting themes should go to multipurpose stakeholder to settle the conflicts between the departments under the ministries. For example, in the case of agroforestry, when the impact of any project seems good the two departments’ forestry and agriculture try taking the credit, but blame each other for failed or failing programs. Therefore, there needs to be a proper multi-stakeholders coordination mechanism.

Suchita Shrestha: Certainly, conventional agriculture has provided us the economic benefits, however, when we talk about green economy, it should provide not only economic benefits but maintain ecological balance and ensure sustainability. Commercially produced crops, vegetables, and fruits contain chemical fertilizers and pesticides. Farmers use these chemical fertilizers and pesticides in an indiscriminate ways resulting in health hazards, environmental pollutions such as soil, air, and water pollution, and biodiversity loss. On the other hand, organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity, and cycles adapted to local conditions, rather than the use of inputs with adverse effects. The global market for organic food is increasing every year. Agriculture sector contributes 35% of gross domestic product of Nepal’s economy. Since fertilizers and pesticides have not reached yet to certain remote parts of Nepal, it can be taken as an opportunity to promote the business of Nepali organic products. Government support and favorable policy is therefore the necessity for its promotion as a sustainable business and helping in the uplifting small farmers economically.

CONCLUSION

Nepal, being a mountainous and least developed country, has lots of constraints for the development activities but if capitalized properly it has lots of resources to rely on to move towards a green economy. Sustainable agriculture and livestock, hydropower and renewable energy, sustainable agriculture and forestry sectors are the major pillars of green economy in Nepal. These sectors can be extracted with the proper mobilization of young people.

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