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University Initiatives for Food and Water Security in a Changing Climate

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Highlights

- The development of peatlands should take into consideration their landscape characteristics, and farm-level crop production potentials in order to minimize greenhouse gas emissions (or conversely to maximize carbon stock accumulation in the ecosystem), and to optimize the productivity of cultivated species. Despite the fragility of peatland ecosystems, the application of appropriate management practices could reduce GHG emissions while contributing to ensuring food and water security.
- Hydrological modelling at the river basin or catchment level could provide substantial insights into effective mitigation and adaptation practices to ensure water and food security in upstream, midstream and downstream areas. Such insights could significantly contribute to improving land and water use planning for various sub-catchment levels.
- Participatory management of irrigation systems provides a platform for increased community involvement in water resources management. Although the transition from centralized management to community-based planning and implementation may take time and resources, university engagement may strengthen the incipient local development initiative.
- Conflicts in access to and/or availment of resources (e.g. minerals versus land and water for food production) and in the levels priority of access (e.g. domestic water use versus irrigation) have become more pronounced when juxtaposed with community level experiences in climate variability. Scientists and policy makers need to review the criteria in coming up with decisions regarding the beneficial use of specific resource bases taking into consideration the water and food security requirements of their respective constituents within the context of a changing environment.
- The Bicol region of the Philippines is recognized as an area that is prone to extreme climate and geologic events such as typhoons, landslides and volcanic eruptions. Responses to disaster risks include the development of production systems that are resilient to extreme events. These include the design of buffering mechanisms for food production systems (e.g. rehabilitation and revegetation of mangroves, riparian ecosystems, and agroforestry farms), and of response procedures for the recovery of such systems (e.g. introduction of short gestation crops to address household food needs).

1. Project Activities

   - Introduction

Water and food security in the different bio-regions of Asia-Pacific have been affected by climate variability (e.g. extreme rainfall events accompanying monsoon surges) and adversely impacted by climate change (e.g. increased occurrence of typhoons during months when these weather events were supposed to be rare). During the 6th Executive Forum on Natural Resources Management conducted by the Southeast Asian Regional Centre for Graduate Study and Research in Agriculture (SEARCA) on 11-13 April 2012, issues on food and water security in a changing climate were discussed. In view of the trans-local nature of climate change and of water and food security issues, many faculties of agriculture in the region are reframing their respective research and extension agenda, curricular programs, and teaching modules to keep abreast with local needs and conditions, and have expressed the need to share localized research results and adaptation activities, and to identify trans-boundary initiatives that can further strengthen university programs in teaching, research and extension.

From social and natural science perspectives, (Kada, 2012) pointed out that ecological degradation was affecting food supply and safety in many Southeast Asian countries, and that food and health risks had worsened due to impacts of changing climate on farmers. These risks have redefined opportunities for food production and require a review of food and water security and rural development strategies. In addressing these changes, however, scientists have realized that they should link with local communities and governments to find effective, site-specific and climate-resilient natural resources utilization and management modalities.

   - Objectives of the Project

As a follow through to the SEARCA Forum, this project intends to strengthen the capability of faculties of agriculture to formulate research and extension agenda, design curricular programs, and produce knowledge materials that address water and food security concerns within the context of climate variability and change. In the process, the project provides a venue for university professors and government planners to exchange ideas on the issues, challenges and imperatives of development and environmental nurturance, and on community-based adaptation strategies that promote water-efficient and climate-resilient food production. It further attempts to broaden the exchange of knowledge and experiences on the impacts of a changing environment on water and food security, create greater awareness to strategies for reducing climate-related risks, and facilitate the adoption of proactive policies that support green growth and science-based programs. It targets scientific personnel in faculties of agriculture to enhance their respective research on global climate change, and to develop partnerships and collaborative projects in teaching, research and community outreach that transcend national boundaries.

- Description of Work Undertaken

Project activities are expected to translate into research and extension agenda and programs to develop climate-resilient water resources management and food production systems, and curricular programs and learning modules that incorporate topics on climate impacts on food production and water management. The first major activity undertaken by the project was the Inter-University Project Planning Meeting held on 28-30 October 2013 at the Center for Land Resources Study, Faculty of Agriculture, Gadjah Mada University in Yogyakarta, Indonesia. This meeting aimed to:

1. Enhance the understanding of the team members of the concept of the project;
2. Identify and select appropriate methodologies for project implementation; and,
3. Discuss updates to the various country papers submitted to SEARCA for the 6th Executive Forum on Natural Resources Management: Water and Food in a Changing Environment.

Another on-going activity involves the documentation and mapping of relevant experiences and good practices in incorporating food and water security and climate change issues into agricultural research and extension projects and into agricultural curricula and teaching modules. The initial results of this country-level documentation and mapping exercise will be shared and discussed during the second Inter-University Meeting to be held at the Royal University of Agriculture in Phnom Pehn, Cambodia on the first week of February 2014.

- Project Results to Date

Peatland Reclamation vis-à-vis Sustainable Peatlands Development for Food Crops Production

Rural people in Indonesia still rely on agriculture on farms that are getting smaller. Nonetheless, agriculture contributes about 15 percent to total GDP, and has helped the economy recover from the financial crisis. This sector, however, is vulnerable to climate change, while being a significant contributor to greenhouse gas emissions—peat burning, in particular contributes about 469MT per year.

Indonesia's tropical peatlands cover some 20.6 million hectares (about 10.8% of total land area) scattered in the lowlands of Sumatra, Kalimantan, Papua and Sulawesi. Peat, a partially decomposed biomass, is formed in waterlogged areas where soils are anaerobic, causing the rate of biomass accumulation greater than the rate of decomposition. Peat domes flanked by two rivers can develop into backswamps, depending on the hydro-topography, the distance of the land to the sea, the amplitude of the tide, season of the year, field position, and the existence of either natural or artificial canals connected to the river.

The use of tropical peatlands for biomass production should consider the thickness of the peat, which range from 50 to more than 300 cm deep, because the potential use for agriculture is limited due to poor nutrient levels, flooding, and the type of mineral soil beneath the peat. Reclamation of peatlands for annual crops would require a drainage network that can control the rate of drainage both at the area and the landscape levels. Existing canals, usually designed for the rainy season, leach out excess water while keeping water at a certain level (Darmanto, 2001). Maas (2008) reported that the regulation of water levels for water storage during rainy season, and the opening of floodgates during dry season in micro-canals of peatlands with a thickness of 20-50 cm, were able to improve cropping patterns for rice, in accordance with government regulations on the use of cultivated peatlands to control water, and to prevent the oxidation of pyrite and the exposure of the quartz layer.

The establishment of floodgate controllers in each channel is an important component to regulate the water table in peatlands considering that different crops need channels of different depths. Rice, for example, needs to be flooded but with intermittent water replenishment, whereas rubber, coconut and oil palm require drainage channels of about 20 cm, 30-50 cm and 50-80 cm deep, respectively. Uncontrolled canalization of peatlands could result to fire, which could naturally happen during long dry periods due to the reduction of water holding capacity. Widening and/or deepening of canals connected to the river may accelerate water flow out of the peat dome. When the water level goes lower than the ground level throughout the year, land would eventually become rainfed; as exemplified by the Central Kalimantan peat dome which is traversed by the main drainage canal, thereby making the peat dry (e.g. during the 1997 ENSO) with fire breaking out almost everywhere.

Subsidence of surface peat, as a result of decreased water retention ability, usually occurs after peatlands are drained. Through a deepening of groundwater levels, the drying peat surfaces are usually unable to recover from these conditions. The rate of subsidence depends on the maturity level of the peat, the peat type, the decomposition rate, the density and thickness of the peat, the depth of drainage, the local climate and land use (Wösten et al., 1997 in Agus et al., 2008). Wosten et al., (1997) and Agus et al., (2008) reported that in Sarawak, Malaysia, where the depth of the groundwater averaged at 100cm, peat subsidence came to about eight cm per year. For peatlands with an average groundwater depth of 25 cm, subsidence was about two cm per year. This means that in peatlands with groundwater depth of 25 cm, peat surface subsidence (10 cm) would be below the critical threshold criteria for wetlands. But when peat surfaces drop by eight cm per year or 40 cm after five years, peat subsidence exceeds the critical threshold of 35cm every 5yrs for wetland destruction.

As observed by Wösten (2001), every ten cm depth of drainage leads to CO_2 emissions of 13 t/ha per year although Hooijer et al. (2006) reported that CO_2 emission would only be about nine t/ha per year. For oil palm plantations with an average drainage depth of 80cm, CO_2 emission is estimated at about 73 t/ha per year or 1,820t/ha every 25 years. Therefore, a single 25- year cycle for oil palm is more than twice the carbon emitted by forest clearing which is only around 587 t/ha.

Moreover, Batistel (2008) concluded that conversion of land use from rubber to oil palm would involve the draining of peat swamps, clearing of forest and burning of biomass; all of which accelerate CO_2 emissions. Draining of peatlands would decrease the peat depth as lower water table exposes accumulated organic materials to atmospheric oxygen. Consequently, soil temperatures rise and increase microbial activity, which enhances decomposition of accumulated organic matter and/or increases the susceptibility of peat lands to fire, which leads to CO_2 emission.

The conversion of rubber plantations to oil palm reduces diversity because most oil palm plantations are monoculture systems. In rubber plantations, the under-storey vegetation could still support varied forms of life. Besides, the turnover of biomass carbon from oil palm-based land use systems is less than that of rubber plantations, thus affecting total carbon stocks of the landscape. In West Aceh, oil palm plantations are established mostly in peat swamps. Land use planning should, therefore, consider establishing the plantations in non-peat areas, or by establishing shallow drainage canals for oil palm plantations to minimize the risky impacts of drainage. Another option could be to consider intercropping or mixed cropping practices for rubber and oil palm plantations to improve biodiversity. This would not only have less negative ecological impacts but also help the Aceh farmers economically. The selection of crop species to be integrated in oil palm or rubber plantations, however should be carefully done considering the low nutrient content of peat soils.

In summary, the use of peatlands should, therefore, take into account their vulnerability to fire hazards as determined by hydrotopography type and the presence of a buffering water swamp forest from the backswamp, by the suitability of land use based on certain parameters such as soil pH, by the level of peat degradation, and by the ground water level, which determines the conditions of peat oxidation/reduction.

Climate Change for IWRM: Lessons Learned from the Citarum Catchment

In Indonesia, extreme climate events are associated with the El Niño Southern Oscillation (ENSO) with significant reduction of dry-season rainfall expected during warm ENSO episodes, and significant increases of precipitation during cold episodes. The Institut Pertanian Bogor (IPB) or Bogor Agricultural University has been advocating for long term efforts to increase the resilience of agricultural systems to climate risks through policies and plans that take into account climate change. Through the Center for Climate Risk and Opportunity Management (CCROM), hydrological modelling has been conducted for the upstream, midstream and downstream portions of the Citarum catchment of Central Java. Specific recommendations include the institutionalization of the use of climate information in agricultural management and development, the giving of priority to structural interventions to minimize the impact of increasing climate risks, the expansion of agriculture to areas with lower climate risks, developing varieties that are resistant to drought, flood and high salinity, and research on climate modelling and on mitigation and adaptation technologies.

Water Management for Food Production: Issues and Concerns for Agricultural Education

The Royal University of Agriculture is the flagship public agricultural higher educational institution in Cambodia. The Agricultural Technology and Management faculty handles water resources management for food production in its curriculum, conducts research on hydrology, ground water, irrigation and drainage systems for agricultural production, including studies on water use efficiency and water pollution in the peri-urban areas of Phnom Penh, and implements projects to strengthen famer water user committee and to promote inclusiveness and environmental health that are pro-poor, pro-women and pro-environment. The university further seeks to examine the link between climate change, water, and food production, identify water management policies that help achieve food security while responding to environmental change, and identify the university's contributing to education in the field of water resource management.

One major initiative within the context of water resource management for food production in a changing environment is the Participatory Irrigation Management and Development (PIMD), which established Farmer Water User Communities (FWUCs) to take over the management of irrigation systems from the government. Its functions include the regulation of access to water, the collection of fees, and monitoring, interdiction and prosecution of violators. Through these initiatives, the Royal University of Agriculture could share its experiences in integrating climate change issues into instructional curricula and materials, research and development programs, and community outreach with sub-national universities or faculties of agriculture.

Water and Food Security as Affected by Mining and Water Use Options

Direct investment and control, and large-scale purchase or long-term lease of land and water resources in developing countries by capital-rich Gulf States, by trader-investors of Asia, by agribusiness corporations from the United States of America (US), Canada and Australia, and by ASEAN-based agribusiness corporations, when reckoned with the environmental and social costs to communities, point to weaknesses in existing water and environmental policies. Civil society and mass media refer to these investments as "agro-imperialism" (Rice 2009), and threats to domestic food security (Daniel & Mittal 2009), while the Food and Agriculture Organization (FAO) of the United Nations (UN) and the World Bank point out opportunities to increase food production and productivity (Von Braun and Meinzen-Dick 2009; World Bank 2010). In the recipient countries, local governments and rural entrepreneurs see opportunities; while smallholders, rural laborers and local NGOs see threats to local rights, livelihoods, food security, and the environment (Cotula et al. 2009; Borras 2009; Daniel & Mittal 2009). In the Philippines, this belief among small-scale farmers has been further reinforced by the continued promotion of industrial monocrop production even if what the farmers need are capability building interventions for production activities from the Department of Agriculture (DA), and for marketing assistance from the Department of Trade and Industry (DTI). The updates presented during the inter-university meeting highlighted field-level situations, which have critical implications on the food security of affected households and communities, which were examined within the context of farmers' access to and control of land and water resources, and/or related access to and availment of food.

The LIDAROIMMA Irrigators Association, operating in the villages of Liwayway, Danao, Romualdez, Imelda, and Maya, in the town of MacArthur, Leyte, were confronted by: a) the destruction of irrigation canals, and flooding of the rice fields of farmers who refused to sell their land for use by mining operations; b) the lack of consultations and information dissemination regarding the economic impact of mining on farming; and, c) failure of some national agencies and local governments to ensure food production and sufficiency. For example, although the processing and approval of land conversion applications affecting components of the Network of Protected Areas for Agricultural and Agro-industrial Development (NPAAD), which covers all irrigated areas, and all irrigable lands already covered by irrigation projects, had been suspended, the mining company was able to buy farm lands in its areas of operation. Consequently, the area devoted to rice production, or the service area of the Balire South River Irrigation System (BRIS) covering 276 hectares cultivated by 374 farmers, was reduced by 15 to 18 percent. Based on the usual wet and dry croppings per year, and the average yield of 80 cavans per hectare, the converted area could have produced 1,104 tons of unmilled rice. The National Irrigation Authority (NIA), on the other hand, estimated the reduction in yield at 924 tons of unmilled rice per year. Moreover, in January 2011, the BRIS service area was flooded as a consequence of mining operations, and crop damage was estimated to reach PhP37 million.

Estimates of income from rice farming made by the mining company, by NIA, and by the farmers showed that rice production could gross PhP102,000 to PhP120,000. These income levels could convert to a gross income of roughly PhP8,500 to PhP10,000 per month, or a net amount of PhP4250 to PhP5000 per month. A rice-farmer-turned-wage-worker of the mining company would earn a little better if she/he was hired as a mason-carpenter or as an electrician. Farmers whose yields reached the NIA-reported levels could earn a little bit more than the laborers who worked 22 days a month. These notwithstanding, the level of earnings of wage earners were still below the poverty threshold. As such, the wage worker could not be assured of being able to provide food for her/his family at all times.

Table 1. Estimated gross income from rice farming per hectare per year and per month.*

Source of Data	Crop Yield (cavans/ha.)	Gross Income Per Year (PhP)	Gross Income Per Month (PhP)	Net Income Per Month (PhP)
Report of the Mining Company	73	109,500	9125	4563
NIA Records	80	120,000	10,000	5000
Farmer-Respondents	68	102,000	8500	4250

*Computations based on a price of PhP15 per kilogram

Table 2. Estimated gross income from labor employment in the mining company.

Type of Employment	Wage Rate (PhP)	Income for a 22-Day Work-Month (PhP)	Income for a 30-Day Work-Month (PhP)
Labor	220	4840	6600
Mason-Carpenter	250	5500	7500
Electrician	280	6160	8400

On 27 December 2010, LIDAROIMMA members who participated in a seminar held near Lake Bito reported that they were not able to buy fish grown in the lake because of a fish kill. Local residents see Lake Bito as a resource that would need to be protected considering that mining operations being done just 100 meters away from its shore posed a direct threat to the productivity of the lake. Given such condition, local food availability could be compromised by mining operations through the loss of the staple crop (rice) and a major protein source (fish from the lake).

Loss of access to traditional sources of water due to mining could also be exemplified by the plight of indigenous peoples in the village of Didipio, Kasibu, Nueva Vizcaya. In 2007, the mining company operating in the area filed four water permit applications (WPAs) with the National Water Resources Board (NWRB) to divert from the Tubo

Creek and Dinauyan River 3.8 million cubic meters of water annually, a volume of water that could be used to produce 1,538 metric tons of paddy rice. Moreover, Didipio residents opposed the WPAs citing that the mining operations would generate waste, which, when dumped into tailings ponds in upstream areas of the Addalam River watershed, could produce leachates and other discharges that could render the Addalam River Irrigation Project inoperable.

In a case involving community access versus legal entitlements to water resources, officials of the villages of Patag and Gabas, in Baybay City, Leyte, Philippines were concerned that the Baybay City Water District (BCWD), the local water utility that proposed the construction of a water filtration plant, might deprive them of access to their source of water. In 2008, the BCWD already possessed a permit to use water from the Cagnonoc River, traditional source of water to irrigate ricefields in Barangays Patag (39 ha), Gabas (82 ha), and Guadalupe (23 ha). The farmers feared that the river might no longer be able to adequately irrigate their ricefields, and adversely affect their food security and livelihood. The rice farmers then formed the Patag-Gabas-Guadalupe Farmers Association (PAGGFA), and filed a water rights application. To support the farmers, the village councils of Patag, Gabas, and Guadalupe opposed the proposed surface water filtration facility. During various sessions, the three village councils realized that much of the difficulty in dealing with the issues stemmed from a lack of information regarding water rights and role of local governments vis-à-vis the local water utility, and the lack of skills for handling the dispute with the BCWD.

This case pointed out the value of asserting community control over local water resources to ensure sustainable and equitable allocation through cooperation among community members (Barlow 2009). Barangay officials demonstrated that being capacitated in the areas of water rights, and possession of conflict management skills, allowed them to handle local-level conflicts. Nonetheless, to institutionalize water governance, barangays need to eventually prepare a water sector plan that would cover the conservation and sustainable utilization of water in all its competing uses.

Water Resources Management Affecting Food Production in the Bicol Region

The Bicol region of the Philippines is generally hilly and mountainous with many rivers, lakes, bays, mountains, volcanoes, waterfalls, caves, and springs. With a mean annual temperature of 27^{O}C and an average annual rainfall of 3,013 mm, which is evenly distributed throughout the year, its economy is basically agricultural with rice, coconut, corn and abaca as major crops. Although irrigation is a crucial element of production, dams and water impounding projects have inadvertently deprived many downstream rice production areas of water, leaving previously irrigated paddies to fallow. Adding to the hardship of farmers and irrigators’ service organizations is the debt burden incurred for the capital outlay of such projects even if these did not result in improved productivity.

Natural calamities have further worsened the situation leading some farmers to abandon their lands in search for better options.

As of 2008, the Bicol region had 11 proclaimed Watershed Forest Reserves covering a total of 377 km^2. Supporting the National Irrigation Systems in Bicol Region are 15 river watersheds which are currently proposed for protection. Once approved, an aggregate drainage area of 2,080 km^2 would support the irrigation system of the region, and hopefully ensure water availability for agricultural production. Within Bicol, seven Regional Irrigation Systems (RIS) and one Provincial Irrigation System (PIS) are operated by the National Irrigation Administration (NIA). These include the Mahaba-Nasisi-Ogsong-Hibiga RIS, Daet-Talisay RIS, Matogdon RIS, Cagaycay RIS, Libmanan-Cabusao PIS, Tigman-Hinagyanan-Inarihan RIS, Rinconada Integrated Irrigation, Pili-San Ramon-San Francisco RIS.

Bicol ranked number one in terms of rice production growth rate (Bureau of Agricultural Statistics, 2009). However, this level of growth declined when the flashfloods of January 2011 destroyed 93 km^2 of agricultural lands across the region resulting to production losses of 16,563 metric tons. This displaced thousands of agricultural farmers as lands planted with rice, corn and vegetables, and irrigation facilities laid to waste. The initial cost of damage reached PhP58,070,500 (The Manila Times News, 26 January 2011), and NIA had to allocate PhP1.03 billion for the construction, repair and restoration of irrigation systems (Journal Online, 16 September 2011).

As part of interventions in Productive Systems Development and for environmental protection and preservation, some non-governmental organizations (NGOs) introduced organic rice farming into some project areas. Farmers reported increased yields in organic rice farms, although they observed a 10% decrease in yield during the first cropping. After the second cropping, yields were reprted to have increased by 25-30%. After a few more croppings, the requirement for organic fertilizers decreased due to the rejuvenation of the soil and improvement of its fertility as biodegradable farm wastes decomposed. Farmers, nonetheless, revealed that they experienced the advantages of organic rice farming only because they had adequate irrigation throughout the cropping season.

In anticipation of the occurrence of disasters, other NGOs made the people aware of the importance of trees for environmental protection. Members of community associations were aware of the need to plant trees especially in denuded hills to protect the landscape from landslides and soil erosion. This was important to them because they did not receive any livelihood assistance from the government during or after typhoons or floods. They viewed tree planting as a means to buffer them against the destructive impact of natural catastrophes.

These circumstances demonstrate the importance of implementing community-level activities related to livelihood and productive systems development. National and local governments, and NGOs should work together to assess vulnerabilities of livelihoods and productive systems and/or developing response mechanisms to avert or mitigate disaster risks. Local and national governments should collaborate to tackle issues of land suitability assessments and/or land use classification and zonation, with sustainability of productive systems as an overriding concern. Moreover, initiatives to make livelihoods resilient to natural calamities should be implemented. These could include the identification of mechanisms for the buffering of the productive systems against destructive impacts of extreme events, as well as response procedures to fast track the recovery of production systems and livelihoods. Buffering mechanisms may include massive mangrove restoration and rehabilitation to protect estuarine production areas, and revegetation of riverbanks and riparian areas to protect farms and irrigation structures. Likewise, response procedures could include the design of cropping sequences that would allow for the growing of short-gestation crops to address household food requirements after a calamity.

Possible Next Steps as Discussed during the Inter-University Meeting

- ✓ Universities should strengthen their role in providing technical data and/or information support to communities, and to local leaders and officials in undertaking community-based natural resource management. The case examples cited herein could be discussed in development planning processes being undertaken by local governments and communities. The discussions would provide a mechanism whereby stakeholders could identify, review and/or define/redefine their respective roles, functions and organizational processes, and allow them to agree on institutional arrangements to improve the system of resource utilization and management, and incorporate non-formal education and capability building opportunities.
- ✓ The case studies included in this report could be included as course content of BSc and MSc programs specializing in resource utilization and management. Follow-up fieldwork would allow students to gain actual experiences, acquire factual evidence, and eventually enhance the level of appreciation of the activities being implemented.
- ✓ Moreover, study visits among and between affected communities, local governments, and members of academe should be encouraged to strengthen mechanisms for cross-disciplinary analyses. The resulting discourse could serve as a counterbalance to the pre-dominance of some frameworks (e.g. the need for mining to generate local revenues) without necessarily rejecting them, and hopefully introduce alternative perspectives (e.g. resource generation potential of sustainable resource use options) into the economic development planning framework.

- ✓ Local governments need to thoroughly review their respective programs on water and food security, and identify other compatible resource-use options. To arrive at such a critical balance, communities need to explore the applicability of various methodologies in the determination of alternative resource uses. These methodologies, however, would be contingent upon a good analysis of resource use potentials, and their relation to the local resource use plan. Nonetheless, the determination of resource use potentials would be premised on the implementation of suitability assessments. Any tentative knowledge on resource use potentials could serve as an initial basis for the valuation of resources, and could provide a starting point in the design of resource use optimization and/or productivity improvement programs.

2. Upcoming Project Publications

    - Peat Utilization for Food Production by Maas, Azwar (Corresponding Author)
    - Climate Change for IWRM: Lessons Learned from Citarum by Suharnoto, Yuli (Corresponding Author)
    - Water Management for Food Production: Issues and Concerns for Agricultural Education in Cambodia by Ek, Sopheap (Corresponding Author)
    - Food and Water Security as Affected by Mining and Water Use Options by Dargantes, Buenaventura (Corresponding Author)
    - Water Resource Management Affecting Food Production in Bicol, Philippines by Batistel, Cheryl (Corresponding Author)

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5. Project information form

Project information form

Please complete the form below and append it to your article before submission.

Project Title	Strengthening the Capability of Colleges of Agriculture in Incorporating Food and Water Security and Climate Change and Climate Variability into Curricular Programs, Research and Extension Projects and Teaching Modules
Project Duration	01 August 2013 – 31 July 2014
APN Funding	US$43,000
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Website	http://www.vsu.edu.ph/opt/cme/index.php/departments/isrds (Note: The Project Webpage is still to be developed and uploaded to the university website.)