

OVERCOMING THE SLIPPERY SLOPE

Modern technologies help traditional landholders ensure a sustainable future, writes Whitney Macdonald



IAN WILLETT

The steep slopes of Bohol, the Philippines' 10th largest island, may provide residents with an aesthetically pleasing landscape, but they do little to provide the necessary terrain to sustain the island's primary livelihood – agriculture.

At the agricultural heart of Bohol island is the Inabanga watershed, supplying the Inabanga-Wahig River with water for the island's agricultural, domestic and industrial needs. However, due to the steep slope of the land and inappropriate farming practices, the watershed's sustainability has been under threat.

By assessing the management of the land and water resources within the Inabanga watershed, ACIAR-supported researchers from Australia and the Philippines aim to establish better agricultural practices and management strategies to help secure the island's primary industry.

Farming practices expected to have a positive impact on the Bohol watershed include agroforestry – that is, interspersing crops with forestry to decrease the overall drain of nutrients by an individual crop – and mixed crops. The research has also identified soil-protecting practices such as contour cultivation, building steps into the steeply sloping land and cultivating less frequently.

Leading the project are Professor John Bavor, from the Centre for

Water and Environmental Technology at the University of Western Sydney, and Dr Rogelio Concepcion of the Bureau of Soils and Water Management. Also involved is the Forest Management Bureau of the Department of Environment and Natural Resources.

Professor Bavor says data demonstrates that traditional crops of irrigated and rainfed rice are not the most economically viable crop selections, based on the soil type and land traits. "Farmers are essentially going economically backwards by growing traditional crops of irrigated and rainfed rice because it is costing them more money to grow these than their peso returns," he says.

Now in the final stages of the project, the emphasis is on implementing identified strategies beyond the research field into the everyday practices of the farmers. In order to ensure a smooth transition of knowledge to the farmers, the research team is establishing five community learning centres made up of agricultural experts, provincial government officials and members from the individual barangays (local government areas).

Almost half of the 411,700-hectare island is designated as agricultural land, supporting the farming practices of 80 per cent of the island's population; yet 60 per cent of that land has a slope of greater than 18 per cent and receives more than two metres of rainfall a year.



JOHN BAVOR

Left: weeding rice growing on terraces in the upper Inabanga watershed. Above: local farm families who rely on water for farming and domestic use often complain that the sediment-laden water is difficult to wash in, but do not link the problem to loss of soil in their fields. Right: the region relies heavily on rainfed rice, but farmers are learning that cultivating less frequently can have a positive impact on sustainability in the watershed.



High levels of soil erosion and runoff make it very difficult to sustain conventional cropping practices.

Using land satellite imagery and analysis by Geographic Information System (GIS), researchers were able to correlate land and water characteristics like slope, soil characteristics, soil erosion and runoff to agricultural practices such as crop selection and land management.

The maps generated by GIS looked at the land-use within the watershed, with a focus on agricultural crops and forestry/grasslands. The analysis included the six most prominent crops – irrigated rice, rainfed rice, corn, cassava, coconut and oil palm.

While corn, cassava and vegetables are currently minor crops in the watershed, Professor Bavor says that exploiting them more would be advantageous. “Farmers would economically benefit much more by growing corn, cassava and vegetables.

“Unfortunately, these crops typically increase soil erosion in sensitive landscapes. What we are proposing, though, is that by progressively adopting the good farming practices that are suitable for these crops on this landscape, they will be able to minimise soil and nutrient losses and produce an economically and environmentally viable crop.”

The maps gave comprehensive data about the watershed resources by illustrating a series of land classifications – that is, categorising the soil depth into three groups, the slope into six classes, and the general erosion into five categories. As well, data was gathered from seven experimental soil erosion sites that demonstrated the effects on soil of a broad spectrum of environmental conditions that crops were likely to experience during the year. Nitrogen and phosphorus losses were also measured.

The data generated from these maps was incorporated into a GIS database for future use in a variety of agricultural management decisions, such as selection of more sustainable and productive crops, as well as more effective cropping practices to minimise erosion. The

PARTNER COUNTRY: Philippines

PROJECT: Integrated management of the Inabanga watershed (LWR/2001/003)

DESCRIPTION: Protecting water resources affected by soil erosion and runoff from agricultural lands on the island of Bohol

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accuracy afforded by the GIS maps, compared to traditional manual survey methods, enabled researchers to identify areas of extreme sensitivity and model more suitable agricultural practices for the future.

The decline in agricultural productivity in Bohol, due to unsustainable farming practices, has been exacerbated by the pressure placed on farmers to increase farm income to offset poverty and meet the demands of a fast-growing population (about three per cent a year).

In addition to integrating Bohol farmers and a large group of stakeholders into the research, the team used a range of information technology to gather and analyse the agricultural data.

“Having the data doesn’t do any good unless you can get it into a form that the farmers and stakeholders can use,” Professor Bavor says.

Despite a tendency to resist farming changes, the Bohol farmers have been very receptive to the proposed changes in farming practices, says Imelida Genson, a student member of the research team. The daughter of a Bohol farmer, Ms Genson came to Australia from Bohol to participate in this research as part of a master’s degree.

“I saw first-hand growing up how the poor farming practices and environmental factors only served to maintain the poverty and hardships in the farming industry” she says. “I wanted to do something to help improve the situation of the farmers and the environment of the watershed.”

The dedication and hard work of the members of the ACIAR research team could see the Inabanga watershed flourish. “If we can improve soil and water retention just a little bit, we can significantly improve the livelihood of Bohol,” Professor Bavor says. ◀