# Watershed Management in the West of Bhutan

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Hydro downloading training in Woochu (Bhutan)

**The European Commission-Bhutan Wang Watershed Management Project (WWMP) began in late 2000, started moving forward in 2002 after funds arrived, and will be operational until June 2007. The project document, prepared in 1996, describes more of a support programme for the Renewable Natural Resources (RNR) sector in four dzongkhags (districts) in the west of Bhutan – Chhukha, Ha, Paro, and Thimphu – rather than a watershed management programme.**

However, as the Wang Chhu River is the most important source of hydropower in Bhutan, the project management unit based in Paro Valley took the title of the project at face value, and has attempted over the years to take a more holistic view of the area and bend the activities towards a watershed management approach.

These efforts are encouraged by the fact that hydroenergy production has been the primary engine of growth in Bhutan during the past three five-year plan periods. The recent commissioning of the 1,020 MW Tala Hydropower Project has further increased the total energy production capacity. Once all the Tala turbines are on stream, more than 85% of Bhutan's hydropower capacity will be located within the Wang watershed.

There is no doubt that the two hydropower corporations located in the Wang watershed will be the main contributors to the GNP, in terms of both revenue to the Royal Government, and demand for products and services from the construction and transport sectors. Thus, activities carried out in the Wang watershed area are likely to account for at least one-third of the economy by the end of the 9th Five-Year Plan (2008).

The health of the Wang watershed, the catchment that is vital to the national economy of Bhutan, is therefore crucial. Thus the WWMP has followed two parallel and mutually supporting paths that originally planned to support the RNR sector and the watershed approach. In the following, we provide a brief resumé of just a few of the activities undertaken.

## The RNR sector support path

The activities supporting the RNR sector in the Wang watershed include financial and technical support to agricultural, irrigation, livestock, mainstream, and social forestry activities. Among others the project has supported crop demonstrations, crop field trials, farmer training, the formation of farmer groups and cooperatives, artificial insemination campaigns, provision of breeding stock, the promotion of backyard units (cattle, pigs, poultry, and fish), the establishment of community and private forests, the preparation of field manuals for forestry and agriculture, and the promotion and demonstration of innovative technologies.

***Successes***

- The Bhutan forest sector now has a Forest Management Code and a series of four manuals describing all steps in the formation of community forests.
- The farmer field school approach to extension was introduced in 2004 and was well received by both farmers and extension staff. In the years since then, dozens of schools have been held, yields on the integrated management plots are more than double the farmer practice plots, many farmer-led experiments have been undertaken, and the WWMP has responded to requests to run FFS training and supervise schools in other parts of the country.
- The soil conservation programme introduced formal field training in the four districts, and now over 30 demonstration plots have been established in degraded agricultural and forest areas. As a result, the WWMP provided technical know-how and resources to the three national land management campaigns, inspired by the Minister of Agriculture, that have been undertaken in different parts of Bhutan over the past 18 months.
- More than 30 polytunnels have been introduced to the Wang watershed and selected farmers in the past two years. These have all been recently fitted with drip irrigation kits and, early in 2006, specialists from India's Horticultural Training Centre in Pune provided a week-long training of trainers course to extension staff. One immediate success story derives from Ha District where, due to the longer growing season created by the micro-climate of the polytunnel, one farmer has for the first time grown tomatoes. There were none of the usual marketing problems, as he found ready customers in the market of Ha town.
- Two success stories arise from activities related to group formation. A dairy cooperative has been established in Paro Valley, which, although it has struggled for many reasons for two years, is still up and running and with a growing network of producer members. There are marketing problems, but the Department of Livestock, Ministry of Agriculture is soon to start the construction of a yogurt factory, and this will hopefully guarantee the future of this producer group. The second group which looks destined for a bright future is a mushroom production group based in Chhukha. Shitake mushrooms are being grown, the group is equipped with drills, driers, and other necessary materials, and sales to both the local and international markets are expected.

Both ICIMOD and WWMP have been supporting the yak herders of Soe Yaksa, a widespread community of the Brokpa ethnic group based at 3,800 masl. ICIMOD has provided funds and expertise to improve the winter feed situation through the cultivation of

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Yak winter feeding

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Yak butter moulds and improved butter packaging

improved oats and to re-introduce the practice of pasture burning in the winter on a trial basis, much to the anxiety of foresters. This practice had been banned for many years, but the result of the ban was significant degrading of pastures as unpalatable shrubs and plants took over. WWMP supported the marketing of yak butter through design and provision of butter moulds and packaging and cold boxes for transportation. Fridges have also been supplied. This year 2,500 kg of yak butter is expected to be transported over two days to Paro Valley; trials in previous years have shown that there is a good market for this product. The next trial will involve dry yak meat strips similar to the biltong of Southern Africa.

- The promotion of improved backyard units for cattle, pigs, and chicken, some of which have been integrated into fish farming units, has also been a success. Through strong efforts by district extension staff, communities, and individual farmers, hundreds of these units have been established, permitting households to become more self sufficient in terms of both family nutrition and income. A spin-off advantage has been the greater amount of manure produced for crop fields.

## The watershed management approach

In the original project document, there were only a few elements concerned with watershed management – almost a passing reference. Over the years, efforts have been made to strengthen these components, and the results are outlined below.

- In 2005, the project prepared a draft proposal for a system of watershed management that could be adopted in Bhutan. The country was split into eight main watersheds, and systems of governance and decision-making were developed through which all stakeholders were included, from local communities through sub-districts (geogs) and dzongkhags to the central Ministries of the Royal Government. Guidelines prepared for the preparation of the 10th Five-Year Plan (2008-2012) made specific reference to the need to plan on a watershed basis and thus, this document – the first to describe the modus operandi of development planning by watershed – eventually received considerable attention.

- The Royal Government of Bhutan has for some years been promoting the decentralisation of decision-making and responsibility for development activities, first to the dzongkhags, and now to the geogs. This is a major programme, and WWMP attempted to assist through development of training programmes for the extension and administrative staff in its four western districts. This training of geog and RNR staff to support the decentralisation process and bring the sub-districts into the mainstream as one of the main stakeholders in

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Soil and water conservation training in Tashigang. (inset) A farmer field school cabbage plot in Ha District

planning and development was a success, and the training programmes developed have been taken over in toto by the Department of Local Governance (DLG), which is now responsible for the integrated capacity development of the geog administrations in all 20 dzongkhags. The four dzongkhag facilitation teams established by WWMP for human resource development in the Wang Watershed continue to function under the guidance of the DLG.

- The land-use planning programme was developed in response to the need for participatory planning at community and geog levels, and supported the efforts to promote decentralisation. Over 100 staff concerned with planning, administration, financial management, and RNR development from the four districts were trained in land-use planning and the identification of hot zones which were under threat, where land degradation was taking place, and where areas with development potential existed. As a result, many maps were produced and degraded areas received attention.

- The environmental education programme, an essential part of any watershed management programme, was undertaken with the assistance of the Royal Society for the Protection of Nature (RSPN), through the Nature Clubs of 14 secondary schools in the Wang watershed. Action research programmes were designed and undertaken in the catchment areas of the schools by the students themselves. This included mapping, water and land surveys, identification of major problems, meetings with the communities, and plans of action. In some cases, water-borne health problems were a concern (i.e., *E. coli* levels in the stream), in others water shortages were identified, still in others, disposal of urban rubbish was the main dilemma. These practical activities were much appreciated by schools, communities, and the education authorities and, as a result, the best elements of the programme have been worked into the national school curriculum. Curriculum development activities along these areas are currently being piloted at Class 7 and 9 levels. Since 2005, the WWMP environmental education programme has been adapted for use in the non-formal sector, and, in 2006, nine adult education centres are involved in this sub-programme, pilot testing the manual on 'Community Watershed Management' under the guidance of trained staff.

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Controlled burning of yak pasture in the winter on a trial basis

- Little work in the field of hydrometeorology has been undertaken in the small catchments that are the source of the waters that feed the main rivers on which the hydropower stations are situated. Little is therefore known about the physical conditions relating to seasonal water availability, supply and use in these crucial sub-catchments; such knowledge is even more crucial currently with the growing concerns relating to climate change and the potential loss of Himalayan glaciers. WWMP has established networks of stations in four sub-catchments, a total of 42 stations, 18 hydrological and 24 metrological. These are being managed in conjunction with the Department of Energy, which will be responsible for monitoring the networks following the closure of WWMP. Over 50 staff members have been trained in the catchments to monitor these stations, and the data collected in the first two years is being analysed.

For the project management unit, with only seven months remaining of the project, the challenge is to institutionalise the successes – and find a home that can technically and financially support the programmes into the 10th Five-Year Development Plan (2008 – 2012).

*For more information on the WWMP – achievements, hurdles, difficulties, failures – please contact the Co-Directors at WWMP,*

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