

## **Spate irrigation in Eritrea**

In contrast to other countries spate irrigation is a relatively new phenomenon in Eritrea. The area presently under spate irrigation (assessed at 14,000 ha) is a fraction of the area that can be developed (estimated by various sources between 60,000 to 90,000 ha). As elsewhere in this region the area under spate irrigation is increasing. The common opinion is that spate irrigation was brought to the Eastern Lowlands by Yemeni immigrants from across the Red Sea some 100 years ago. At present there are approximately 12 areas along the Eastern Lowlands where spate irrigation has developed to a considerable degree. Sheeb and Wadi Labka - the two areas singled out in ELWDP - are among the largest of these areas. The traditional systems rely heavily on stone and brush wood spurs and earthen guide bunds. The brushwood used is *Acacia Nilotica*, with its characteristic fine needles solidly interlocking. This helps to trap other sediment and floating material. This makes the spurs more efficient, as in Wadi Laba, or protects and reinforces the rather loose and sandy guide bunds, as in Wadi Labka. The Sheeb systems so far are the only systems where civil engineering investments of considerable nature and size have been made. A large new system, Naro, is under preparation - to be funded through an American NGO. Naro is a virgin scheme; there is no history of spate development in the particular area. Earlier through the same funding channel, the Badaa system was developed in the Danakil depression - using mainly gabion headworks. These however were put out of service after four years of operation. Because Badaa is on the border with Ethiopia no further work has been taken up. Apart from these larger investments, support to smaller systems has been given through the Community Development Fund and earlier as part of the field activities of the EPLF. The Ministry of Agriculture also makes bulldozers available against subsidized rates. This service is in high demand.

A striking feature of the systems in the Eastern Lowlands is the water management strategy. The intention in Sheeb is to concentrate the spate flows rather than spread it widely. A relatively small area is irrigated preferably three times or more - prior to sowing. After every irrigation fields are ploughed and field bunds restored - if animal power is available. At the end of the flooding season the land is covered with a layer of sand to minimize evapotranspiration. The result of this strategy is that in a good year harvests in Sheeb are much larger than in spate system elsewhere in the world - reaching up to 3500 kg of sorghum on the first cutting and half of that in addition as the ratoon crop. This makes spate irrigation far less of a marginal pursuit than elsewhere.

Most spate development in Eritrea has taken place in the Eastern Lowlands. In contrast in the Western Lowlands there is no tradition of spate irrigation. In recent years mainly the Ministry of Agriculture has developed a number of small flood diversion structures. There is little in the way of farmer-developed diversions in the Western Lowlands. Funding has come either from the national budget or from external agencies. The interest in developing the new spate systems in many cases is fuelled by the policy of settling return refugees from Sudan. The newly developed diversion structures art of Eritrea consist of soil bunds, ungated masonry/concrete weirs and gated weirs. Almost without exception they are built on relatively minor tributaries. This has simplified the issue of settling access to land and water. Investment costs are in the USD 30-100,000 range or USD120-480/ha, which brings it within the capacity of local contractors to build and local government to oversee.

Command area development in the Western Lowlands differs substantially from that in the Eastern Lowlands. In the Eastern Lowlands all fields are bunded, allowing water to be temporarily ponded before it is released to the next field under the prevailing field-to-field system. In the Western Lowlands water distribution over the command area is far less sophisticated. With the help of guide bunds water is spread over the command area. In the absence of field bunds water is not retained in field. Less water is conserved in the soil profile as a consequence and also soils do not build up, as they do in the Eastern Lowlands. The high yields of the Eastern Lowlands are not attained in the Western Lowlands, though they are still considerably higher than on the rain-fed land. Whereas on rain-fed land average sorghum yield is 450 kg/ha, in the spate systems crop cuttings by the Ministry of Agriculture indicate yields of 1200-2100 kg/ha. Ratooning is not common in the Western Lowlands. Short maturing (60-70 days) varieties of red sorghum are most popular, as these are least susceptible to moisture stress. At present 1750 ha of land served by flood diversion in the Western Lowlands, but the potential area is estimated to be far larger - 50,000 ha.