Spate irrigation in Ethiopia HR Wallingford/ Meta Meta

Spate irrigation is a type of water harvesting or irrigation, unique to semi-arid environments. It is found in the Middle East, North Africa, West Asia, East Africa and parts of Latin America. Flood water from mountain catchments is diverted from river beds (wadi's) and spread over large areas. Spate systems are risk-prone. The uncertainty comes both from the unpredictable nature of the floods and the frequent changes to the river beds from which water is diverted. Because of this nature it is often the poorest segments of the rural population, whose livelihood and food security depends on the spate flows.

Spate irrigation has developed in several semi-arid areas of Ethiopia. Whereas some spate systems seem to have been in use for several generations, in other areas spate irrigation has developed recently – in response to the increased pressure on land and water resources and an erratic rainfall pattern. Spate irrigation in Ethiopia has been reported from the plains and valleys east of the Tigray, in Afsa close to Serda, from East Haragh, from Nazareth and in the South from the Konso region and the area north of Lake Stephanie (near Jinka). In a large continuum of spate-based production systems there are two categories – high land and low land systems.

Highland systems tend to have smaller catchments and feed from gravelly rivers in the upper part of the basin. The floods are flashy and harder to predict than they are in lowland system. Command areas are relatively small, defined by the hilly topography. Lowland systems on the other hand are larger, receiving water from the mountain watershed. Floods tend to last longer. As rivers wind through alluvial material, river degrade, silt up or change course, posing an additional challenge in the management of the spate system. An example of a lowland system undergoing change as a result of changes in the river bed is Yandefero (see box).

Spate system	**Highland**	**Lowland**
Catchment	Limited	Large
Bed material	Stony, armoured	Sandy, fine
Gradients	Steep	Gentle
Flow	Flash floods	Shortduration flows
Command area	Small	Small to medium
Water distribution	Change of flood channel	Siltation or degrading of river

Spate systems in Ethiopia differ from those in Yemen and Balochistan, where spate irrigation is widespread and long established. In Yemen and Balochistan the entire farming depends on one or two flood events, being diverted to the fields. Additional supplements from rainfall are very unpredictable. Because of the reliance on single events, field bunds are high (1 to 1.5 meters) and field are large. The high bunds serve to impound a sizeable quantity of flood water before it infiltrates. There are clear differences between areas with high and low probability of irrigation. As a result there is a distinct line between have's and have-not's in the flood irrigation systems in Yemen and Balochistan.

In contrast the spate systems in Ethiopia rely more on rainfall. In some systems the spate flows are even supplementary to the rainfall rather than the other way around. Flood water may come several times in a year and as a result spate irrigation is more 'evened out'. The field bunds are low (0.3-0.4 meter) and the water is distributed through a network of small channels. There is far less difference between the various parts of the command area and competition for an unpredictable flood flow is less. As elsewhere spate systems in Ethiopia support cereal crops (sorghum, maize and teff) as well as other crops, such as cotton, Some spate systems also supply livestock drinking water ponds.

Spate systems in Ethiopia are are entirely farmer-managed. So far support to spate irrigation system is provided by non government organizations or research institutes such as the Mekele University, Raya Valley Integrated Agricultural Development Program, Haragh Catholic Church and Farm Africa. It has not always been possible to find technically appropriate solutions in these programmes. Government small scale irrigation programmes have largely by-passed spate systems. They have concentrated on diversions from perennial flows instead.

Yandefero Spate System

Spate irrigation on the lowlands in Konso special woreda in the South of Ethiopia sustains a mixed cropping system of maize, sorghum and cotton. Farmers are mainly smallholders. They do not reside in the lowland area for fear of malaria and tryposomasis, preferring to live in the highlands instead. At present there are 29 flood intakes. The entire area that can in principle be irrigated is close to 4000 ha. Eleven of the flood intakes date back thirty years are more. Most of the remaining ones were developed in the last few years under food for work formula. Recently the Yanda river has started to degrade dramatically – going down one to two meter in large stretches. This has made it difficult to extend the flood channels and the majority of the intakes are not in use.