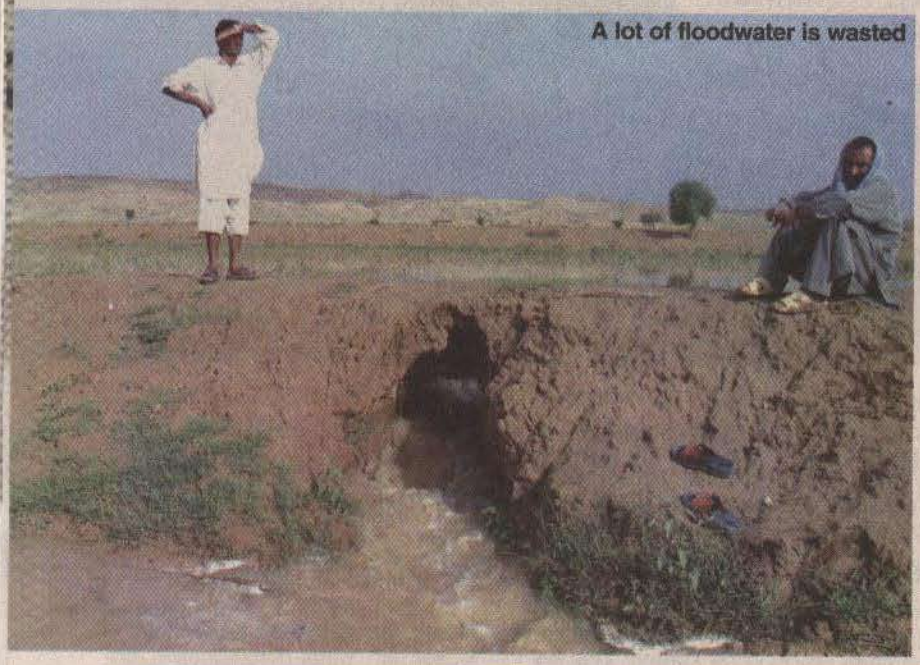
Balochistan.

The largest areas under spate irrigation are on the plains bordering the mountain ranges, along the Koh-i-Suleiman and Kirthar Ranges as well as on the Kacchi Plains.

It normally rains heavily twice a year — in the summer monsoon season and during the winters. When floodwater enters the plains, it is diverted and guided by earthen *bunds* that depend on the lay of the land. Some *bunds* may be more than one kilometre long, several meters high and up to 20 metres wide at the base.

Close to the mountains, the *bunds* tend to take part of the fast flowing flood, but lower down they block the river and divert the entire flow. Water is then guided through a system of flood channels, sometimes marked by low side *bunds* — all constructed by the local farmers in preparation for the flood seasons. For centuries, the making of these *bunds* would be a festive time, with farming communities gathering with their oxen to build these *bunds* together.

Today, with the introduction of bulldozers, the bunds can be built faster and don't require so much manual labour. But the communal spirit has slowly died out, causing many of the *bunds* to be neglected if the farmers can't afford to hire the bulldozer. The old festivities have now become commercialised events, less to do with making *bunds* and more to do with entertainment. However, the engineering has not changed and the farmers still have to construct earthen diversion structures (called *wakra*) which raise the waters in the flood channels and lead them into the *bunded* fields. These *bunded* field (called *bundat*) are often very large — as much as 15 hectares sometimes, though they may be divided into sections.



A lot of floodwater is wasted

There are different spate irrigation systems located in the mountain areas. These are smaller and make use of free intakes. Spate irrigation certainly supports local farming systems, but also rangelands, trees and drinking water supply — either by filling water ponds or through the recharge of shallow aquifers in some places.

However, due to its reliance on floods as the source of water it is inherently risky and uncertain. Even then in dry areas it is the most cost-effective way to retain and store water. Improvements in soil and water management, agronomy and governance have considerable potential to increase water productivity and enhance livelihoods in one of the most poverty-stricken areas of Pakistan. These lands can be transformed if enough attention is paid to them by scientists and policy makers in Pakistan.

Subsistence crops, often sorghum, millet and wheat are planted only after irrigation has occurred. In Pakistan, there are two main cropping seasons — summer and winter. Crops are grown from one or more irrigations using the moisture stored in the deep alluvial soils formed from the sedi-

Before it is too late

Floods are part of climatic catastrophes throughout the world, but in recent years we are witnessing an increase in their occurrence and severity. There is no hard and fast rule to deal with the natural disaster but it is important how one responds to it.

Indigenous communities have learnt to survive in difficult situations, in many cases without institutional support, though on a limited scale. Villagers in some parts of Pakistan see floods as something partially useful. Many parts of Balochistan and the foothills of Suleiman Range and Kirthar Range in Pakistan receive floods through hill torrents and manage it through indigenous water user organisations and ancient methods like spate irrigation.

Upon the drying of moisture in the field, seeds of local varieties are sown and no further irrigation is applied. Reasonable production of high value crops is obtained in the form of seed and fodder. Livestock is the major industry that depends upon this type of agricultural system. No fertiliser is applied nor are pesticides used. It is pure organic farming and environmental friendly practices are applied throughout the land.

Once the flood water seeps down into the soil, different types of shrubs, bushes, grasses, trees, medicinal plants, mushrooms, (underground mushrooms) and wild vegetables sprout in these areas. Flood water brings along seeds and organic matter highly useful to local fields and excellent range-lands emerge to meet the livestock requirement of local and nomad tribes.

Floods also help in recharging underground water in certain areas which is beneficial for vegetation and pumping by tube-wells. In high lands of Balochistan floods also help to recharge *karezes* (underground channels). Moreover floods help to increase the water supply from springs and perennial flow of streams. This is the right time to cater to the appropriate sites in hilly areas to check the flood speed in order to recharge the underground water and let the natural vegetation grow.

The recent floods of Balochistan also demonstrate that professionals, bureaucrats, policy makers and even NGOs see the flood as something of a completely devas-