The *Khaznam* of Goa

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The *Khaznam* (Khazan lands) of Goa, are agricultural lands, which are subject to inundation by the neighbouring river from which they are protected by *bunds*. These salty low lying flat lands were originally mangrove swamps/mudflats lying along both the banks of the rivers of Goa. The early settlers of this place who came down from the Ghats reclaimed the lands by constructing mud *bunds* all along the river and started cultivating them. There are no written records to show when the early settlers occupied the present land of Goa, and how and when they established the *khazn*am. Xavier (1852) postulates that it was sometime between the 8th and 9th century A.D. The settlers, after reclaiming the land, formed a system of *gaumkary (village associations)*, to own and cultivate the land collectively and gave themselves a set of laws. In this article we describe the working of the *khaznam* of Goa. Earlier descriptions of these lands have focused on the socio-economic aspects while the emphasis in the present article is on the processes behind working of a *khazan*.

The *khaznam* consist of four main components: the *bundh*, the *manas* (sluice gate), the *pôiim* (internal water bodies) and the rice fields - elevated portion of land for cultivation. Each one of the first three components has its own role to play in the cultivation and upkeep of the rice fields.

The *bundh* is a 2-2.5m high dam made of the clayey soil from the marshlands or mudflats. It protects the *khazan* from inundation with brackish water from the estuary at high tide, and also helps to maintain water level in the *khazan* during monsoon.

The *manas* (sluice gate) is a simple mechanism that allows water from the *pôiim* to drain out into the neighbouring estuary during low tide while automatically closing during high tide to prevent brackish water from entering the *khazan*. In a way, the *manas* acts as a one-way valve. However, during the monsoon, the normal functions of the *manas* are blocked by using *addambo* that prevents the shutters of the *manas* from opening during low tide. This is done to maintain water level in the rice fields, which is necessary for the healthy growth of rice saplings and also to control spreading of weeds.

The *pôiim* are the internal water bodies interlinked to one another and connected to the estuary though the *manas*. These shallow water bodies act as drainage channels connecting the storm drains of the village to the river during monsoon, while during dry season they act as water receptacles for the *khazan* holding the brackish water leaking through the sluice gate.

The elevated portion of the *khazan* forms the cultivable area (the rice fields) where paddy is grown during the monsoon season. It is divided into *mélgam* (plots) of 0.5-1.0 ha area each. Some summer crops, like vaingann, pulses and vegetable, etc. are also grown under

irrigation, on the lands not affected by saline water. Elevated mud paths (1m x 1m cross-section) criss-crossing the *khazan* provide free access to farmers from the village road to any plot.

Fishing in the *khazan* is a secondary activity, a spin-off of land reclamation. Fishing at the *manas* is done using a special type of net – bag net – which is fixed at the *manas* opening during the low tide when the water from the *pôiim* flows out into the estuary, while fishing in the *pôiim* is carried out using different types of nets, like gill nets, cast nets etc.

After a period of 5-10 years of continuous cultivation, pests like weeds, snails, leaches, field rats, etc. grow rapidly in the *khazan*, making the cultivation of these fields uneconomical. To destroy these pests, the fields are deliberately kept inundated under brackish water for a period of 4 months from January till April-end. This process is known as *handdem*.

A case study was carried out of a typical Goan *khazan,* the Corlim *khazan,* where simultaneous measurements of salinity and water level variations were made in the *pôiim* and in the neighbouring estuary over a period of two tidal cycles, to see the effect of tidal fluctuations in the estuary on salinity and water level in the *pôim*. The results indicate that tidal variations in the estuary have very little effect on the water level in the *pôiim*. While the water level in the estuary showed large variations of 160 cm over the entire tidal cycle, the water level in the *pôiim* varied within a narrow range of only 15 cm indicating that the *manas* system is highly efficient in controlling brackish water intrusion into the *khazan*. Measurements of salinity, on the other hand, indicated that the salinity in the *pôiim* is not controlled by the simple process of mixing of brackish water with the fresh ground water but rather by other complex processes of rainfall, groundwater influx, seepage of brackish water through the *bundhs*, evaporation and leakage through the *manas*.

As a way forward, the article makes a strong case that necessary measures should be taken to ensure that at least a few examples of this intricate agriculture-fishery system survive in the traditional way, as examples of our heritage.