

# Preface

*Khazans* are predominantly rice and fish fields. They are reclaimed wetlands, salt marshes and mangrove areas, where tidal influence is regulated by the construction of embankments and sluice gates. The *khazan* ecosystem is a human made ecosystem, developed by traditional, primitive, tribal communities of Goa through a highly structured system of dykes, canals, furrows and sluice gates from resources that were amply available locally. The *khazan* engineering system has a very simple architectural design, which is self-operating using tidal, hydro and solar energy, and is one that integrates highly complex, eco-friendly agriculture–aquaculture–salt panning functions, having been functional for the last more than 3,500 years.

As a child, I was always more interested in *khazan* fish than in *khazan* history. We relished different fish delicacies prepared by my mother as my father brought home ‘*manoxeche nuste*’ (fish from sluice). Even after my marriage, my interest in ‘*manos*’ grew, as I started buying fish from local fisherwomen selling fish in the local fish market. I was fascinated watching them hail out to the potential customers with constant calls, ‘*Bay, manoxeche nuste var go*’ (‘Oh lady, please buy fish from sluice’) or ‘*Bori manoxechi sungata ayalyat mago*’ (‘Good quality prawns from sluice are being sold in the market’). Often they would prescribe some fish recipes while buying fish, such as ‘*Bay, tora ghalun bes bori sungatachi kodi kar go*’ (‘Prepare tasty prawn curry with raw mango’).

While I was working for The Energy and Resources Institute (TERI) in the late 1990s, the then Tata Energy Research Institute, I came across some information cited from a report submitted by Dr Nandkumar Kamat on *khazans*, a consultant for TERI. Around the same time, Dr Ligia Noronha, the then Head and In-Charge of TERI’s Western Regional Centre in Goa, entrusted me with studies on aquaculture for a European Commission project titled ‘Interactions between environment, society and technology’ (INTEREST). I opted for traditional aquaculture systems in Goa, *khazans*. Thus, my journey with *khazan* ecology began in the late 1990s. I continued my work with *khazans* for 5 years in TERI with another project, ‘Role of institutions in global environmental change’, funded by the Asia Pacific Network (APN), Japan. However, during these years, work was restricted to *khazans* of

Divar. I had to break this journey while I worked and coordinated other research projects in TERI, such as 'Assessing impacts of tributyltin on multiple coastal uses', or 'TBTimpacts', funded by the European Commission. Later, as I moved to the Centre for Environment and Natural Resource Management, Srujan, I worked on a larger project titled 'Seas and shores around us'. My obvious choice was *khazan* ecosystems. This stint generated an emotional bond and intimate association with *khazans*. Human migrations in Goa, arrival of *Gaud Saraswat Brahmins* (GSBs), various legends on Goa, history of *khazans*, indigenous resource management institutions and their metamorphosis into formal institutions, the *gaunkari* system, names of places and persons, cultures and traditions involving ecological knowledge, the Portuguese colonial regime in Goa ..., there seemed to be no end to *khazan* links with Goa. Everything in Goa and in the life of Goans appeared to be connected with *khazans*. Till date, the staple diet of Goans, that is fish curry and rice, is obtained from *khazans*. The rising sun of each day reminds market-going Goans of *khazans*, and as the sun sets over the Arabian Sea, the day of most Goans generally ends with '*agorache niste*' (fish from *khazan* aquaculture farm). Goans perceive *khazans* as dear to them as salt.

Primitive communities of Goa might have developed *khazans* to provide them abundantly with their daily needs of food. Particularly for the *Gaud Saraswat Brahmins* (GSBs), who had faced famine on the banks of the now extinct River Saraswati, Goa provided a rich haven with her replete natural resources. *Gauda* settlements in hilly areas helped them with their ecological knowledge. *Khazans* were developed in such an environment that was highly conducive to aquaculture, by people who had migrated from adverse environmental conditions. Human migration in Goa dates back to the Palaeolithic era. Migration of coastal settlers on the central and southwest coast of India perhaps has Harappan affiliation. Ancient civilizations generally flourished along the banks of fertile river valleys. Primitive coastal settlers of Goa converted saline estuarine plains, then regarded as wastelands, into a rich medley of green, blue and white with integrated knits of agriculture, aquaculture and salt pans. Indigenous ecological knowledge (IEK) embedded in the construct of *khazans* is evident. Much can be learnt from IEK entrenched in *khazans*. *Khazan* experiments successfully conducted by the traditional communities of Goa can be replicated in other parts of the world as adaptation mechanisms to cope with the global environmental change (GEC).

*Khazan* lands of Goa that fascinated primitive settlers of Goa also appealed to the local Goan artists and writers. '*Samudratali chandi*' ('silver from the sea', referring to fish from the sea) and '*bimalan ros*' with '*manoxechi sungata*' fascinated a renowned Goan poet, B. B. Borkar. To this day, harvests from *khazans* entice the Goan as well as the floating tourist population. *Khazans* are intricately associated with Goan life till date. Unfortunately, there is a degradation of these unique and ancient heritage ecosystems as certain groups find profits in the conversion of such systems for building and non-agricultural purposes. Such groups often seem to forget that conservation of *khazan* ecosystems is conservation of local culture and global biodiversity. *Khazan* ecosystems qualify as world historical or world heritage sites, and these endemic and heritage ecosystems deserve conservation not just as

gifts from our forefathers but as debts from our children. To quote John James Audubon's words, 'A true conservationist is a man who knows that the world is not given by his fathers, but borrowed from his children'.

My interest in the ecological history of *khazans* only grew as I continued reading bits and pieces of literature written by Goan authors, in local languages as well as in English. Therefore, when I was invited to write a book by Springer Verlag, I put forward a proposal on *khazans*, which, realizing the importance of the subject, Springer was pleased to accept. For this, I am truly grateful to Dr Robert Doe, Senior Publisher, and Naomi Portnoy, Project Coordinator, at Springer Netherlands. The publication of this book shall assist me and, consequently, the *khazan* ecosystems to reach a wide national and international audience. We are hopeful that this, in turn, will greatly assist the case of conservation of these ecosystems at this crucial juncture when short-term gains towards modern technological advances tend to run down the heritage and wisdom of indigenous traditional knowledge. I am constantly reminded of late Dr Elinor Ostrom who encouraged me to write on *khazans*. I am, indebted to her for her support. I am also grateful to all those, particularly many *khazan* farmers and fishers of Goa, who richly contributed to my knowledge base on *khazans*. The last few months, I lived in the world of *khazans*. My entire family, too, often visited my world of *khazans*, offering their time, intellect and enthusiasm in the form of insights, suggestions, information, critique, feedback, etc. The contribution of my husband, Mahesh, to my world of *khazans* is great. *Khazans of Goa* assumed a better shape with his support and comments. My 11-year-old son, Eeshan, always ready to help me with my fieldwork, had to endure much inconvenience. My parents provided valuable information on the importance and use of biodiversity and indigenous knowledge in Goan rituals and festivals. My mother-in-law read my drafts with great interest and offered advice. My sister-in-law, Sushama, provided a book on Vengurla with some bits of information, which are included in the cultural aspects of *khazans*. My friends Savita Kerkar, Janet Rubinoff and Nandkumar Kamat helped in enriching the book by providing me access to their research papers on *khazans*. Lastly, my list of acknowledgements cannot be complete without thanking Mr. Janmejay Kandolkar (Jalmi), who drove me around during my field trips and offered assistance in my fieldwork. With gratitude to all those who contributed to *Khazans of Goa*, I present to the readers the world of *khazans*.

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