Ocean & Coastal Management 102 (2014) 393–397

Contents lists available at ScienceDirect

Ocean & Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

Editorial

The Korean tidal flat systems: Toward transformation from land reclamation to wetland protection

The present special issue entitled 'The Korean tidal flat systems: Ecosystem, land reclamation and struggle for protection' provides an earnest treatment of key issues on the Korean tidal flat systems, highlighting the perspectives of ecology, human use and management. The western coast of the Korean peninsula, pertinent to the eastern part of the Yellow Sea, also known as the West Sea, has long stretches of tidal flats along a ria-type coastline with numerous indented bays. The Korean tidal flat systems meet coastal mountains directly on the coast in many places and therefore create a unique landscape which is quite different from the opposite shores of the Yellow Sea (i.e., the coast of Jiangsu Province) or the Wadden Sea in northwestern Europe where the coastal plains recede deep into the mainland.

1. System thinking: the visionary approach

We dared to apply the term of 'system' in the title of the special issue and also in several articles. This application complies far less with the on-the-ground reality in research, surveys, management and human uses on the Korean tidal flats. Primarily, to be satisfied with the use of the 'system', we had to have relevant research and consequent discussions in the scientific community, and the content of the term 'system' should then have emerged progressively from the expert groups in a quite natural way. However, the science of the Korean tidal flat systems is not so far advanced to meet the system research. The major components of the tidal flat ecosystems are familiar to the Korean experts, but interactions among the components from the system's point of view are far less studied. The functional aspects including the food web study should be strengthened to understand the system. If we go beyond the ecosystem study, then the studies on human systems such as social and economic systems became much poorer. The coupled human and natural system can be clearly observed in the fishery activities carried out by local communities that are quite dependent on these extensive tidal flats. These communities are understandably sometimes not too cooperative when for instance large-scale land reclamations devastate the fisheries resources in these coastal systems. We dare to say that both the ecological and socio-economical system study on the Korean tidal flat systems should be far advanced to apply the term of 'system' in the title of the special issue. Nevertheless, the application of the 'system' can be instructive for future research, management and human use, coupled with the tidal flat ecosystem. The application of the term of 'system' was anticipated to guide the current, fragmented topics and methodologies, to a visionary approach toward a systematic and comprehensive ecological and socio-economical understanding of the Korean tidal flat 'systems'.

2. Human practices: reclamations outweighed in the Yellow Sea region

The Yellow Sea system, including its innermost component of the gulf-like Bohai Sea, is bound by approximately 18,000 km^2 of tidal flats. The tidal flats in South Korea account for 2500 km^2 of the Yellow Sea system's tidal wetlands; and tidal flats in North Korea are of similar geomorphologic scale. Here, we used the term 'Yellow Sea system' or 'Yellow Sea region' to include the entire Yellow Sea coast from China, encompassing the Bohai Sea, DPR Korea and RO Korea and even the Japanese coast at Kyushu, located in the southward direction of the Korean peninsula. The Ariake Sea in Kyushu contains 200 km^2 of tidal wetlands, which is one single long stretch in Japan. Tidal flat stretches in the Yellow Sea system are partitioned into Jiangsu, Bohai Bay, Korean Peninsula and Ariake Sea in a counter-clock-wise direction, in contrast to the single, coherent tidal wetland system developed along the mainland of the Wadden Sea. The tidal wetlands in the Yellow Sea region are exceptional of scale and can be attributed to the semi-enclosed geomorphology of the region. The large tidal ranges (i.e. 3–10 m) and related hydraulics result in a mega-tidal regime of which the effects are further amplified by massive inputs of suspended sediments from the major rivers.

Human practices in the entire Yellow Sea region favour land reclamation, with a poor contribution to the protection of the subareas. The Yellow Sea system was subject to massive land reclamation in the 1990s and 2000s, including Jiangsu (600 km^2), Bohai Sea (1000 km^2), Sihwa (180 km^2) and Saemangeum (400 km^2). These large-scale land reclamations proceeded in recent years and stand in strong contrast to the situation along the Wadden Sea coast, where large-scale land reclamations received less interest after the completion of the Zuiderzee project in the early 1930s. The transgressive reclamations by earthen seawalls went back to medieval time, but the 32 km long dam, the Afsluitdijk, separating the former Zuiderzee from the Wadden Sea, was the last modern engineering applied large-scale dike construction of the Wadden Sea area. In the Yellow Sea region, the technology applied to embankment projects started after the second half of the 20th century. The temporal trend of the embankment and land reclamation is country specific. China has realized extensive land reclamations until today and the future plans are as challenging reaching to about 2500 km^2 of approved projects by 2020 for the entire Chinese coast; and about 1100 km^2 for the Yellow Sea and Bohai Sea coasts, while at the same time the sediments transported to the coasts by the rivers have generally declined. South Korea culminated the land reclamations in recent decades (1990s and 2000s). Japan's land reclamation peaked during the 1960s and 1970s, although the

http://dx.doi.org/10.1016/j.ocecoaman.2014.10.019

society suffered from the Isahaya project which enclosed 36 km^2 tidal areas in the Ariake Sea in 1997. The peaks of land reclamation are chronically changing from Japan to South Korea (hereafter Korea), and land reclamation in China has not faded away, starting from 1950s until present.

The present special issue specifies the Korean tidal flat system as a study area of concern, referred to in Korean as *Getbol* where *get* means 'mud' and *bol* means 'extensive broad plain'. Discussions are organized in relation to the Chinese and Japanese coasts. The purpose of this special issue is to present the performance of the Getbol varying from the ecosystem, to the management perspectives, with emphasis on temporal and spatial changes in the ecosystem status, human use and its protection. Generally speaking, the tidal flat 'management', primarily concerns the goals of protecting the ecosystem and its associated sustainable use as demonstrated for the European Wadden Sea. However, in the Korean context, the management of tidal wetlands focuses on the planning and execution of large-scale land reclamations and thus barely covers any protection. Protection in Korea has been outweighed because of the strong political desire for large-scale land reclamations. Thus, ecosystem protection in Korea can hardly be considered a major or important goal in wetland management. Spatially, the protection of the Getbol has by far not been brought in balance with the land reclamation, although Korea's policy strategy seems to be transforming from one of land reclamation to that of protection.

In 2012, the Getbol Protected Areas (GPAs) in Korea totaled about 220 km^2, distributed across 12 sites along the entire West Sea coast. By comparison, since the 1970s, ~2400 km^2 of tidal wetlands have been transformed into reclamation areas. Even the relatively limited GPAs were only achieved through grassroots movement which supported the stakeholder's opposition to the state-led, large-scale reclamation projects. Environmental non-governmental organizations (NGOs) and religious leaders led protests against the Sihwa and Saemangeum Reclamation Projects and pleaded for the protection of the unique Getbol areas. The disastrous consequences of the Sihwa Lake pollution from the embankment provoked public awareness of the negative aspects of reclamation projects.

In this special issue, we examined why land reclamation has remained prevalent and why the Getbol protection has not shown much progress in the management of the Korean tidal wetlands. Ideally, the management of the Getbol system would be based on forward looking spatial planning, followed by ecosystem protection and sustainable use (e.g. fisheries and tourism). However, the current management strategy in Korea differs dramatically from such an approach. For example, the functional zones of use and protection in the coastal areas, which also cover the tidal wetlands, were recently configured in the amended Coastal Management Act of 2009. A long-term plan applying the spatial planning was developed, but the implementation meets wide opposition. The available political interests will forcefully be wielded against the protection and act in favour of 'spatial selectivity' for use/development. We use the combined term of 'use/development' here because 'use' in the Getbol is outweighed by development-oriented construction projects rather than sustainable use. Thus an overarching spatial planning approach seems to be far beyond the practice at present.

The science-policy interaction in decision-making has often been used as a tool to direct the decision making process. It could be extended to develop future strategies in the use/development and protection of the Korean Getbol. However, some barriers exist. Korea has a rich history in the humanities, but Western sciences were not broadly adopted until the country was modernized around the mid-1960s. The natural sciences, in particular, have experienced remarkable development with a rapid increase of publications in international journals during the past 30 years. However, research related to ecology, and more specifically to the Korean Getbol, did not emerge in international journals until the mid-1980s. Its contribution to international publications still remains relatively sparse. Indeed only about 210 publications related to the unique Korean tidal flats have been published internationally over the past 30 years, which might indicate a less advanced knowledge on the Korean Getbol system compared to many other areas. Consequently, the translation of scientific knowledge on the Getbol into outreach materials is far from sufficient. Scientific information barely played a role in the decision-making and the management of the Korean Getbol. Despite the importance of the science-policy interaction, this issue could not be included in the present volume, because the decision-making related to land reclamation and the protection of the Getbol was infrequently applied in the planning procedure.

The next question is about whether 'governance' supports the decision-making for use/development and the protection of the Getbol. We observed that development or protection was decided through the political processes greedy for power, rather than by well-designed governance procedures with balanced stakeholder or a broader actor participation. To observe how the political power targeting processes dominated in the decision-making, we examined the sample case of the Saemangeum Reclamation Project (SRP), the topics of which are described in four chapters. Launched in 1991, the SRP resulted in the completion of a 34 km long dike in 2006. This project involved three interacting attributes: the Saemangeum ecosystem, the State and the public. The State included decision makers such as politicians and government officials at the central and local institutions. The public raised their concerns and became aware of the troubles of the SRP in parallel to those of the Sihwa Reclamation Project that provoked serious pollution problems in the Sihwa Lake. The State created, managed and finally completed the SRP, despite anti-project protests and negative public opinions, particularly those of environmental NGOs. Finally, the Seamangeum ecosystem, located at the estuary where the Mangyeong and Dongjin rivers merge (also known as the key area in the Korean tidal flat system) was sacrificed under the SRP. The State forced the entire process of the SRP from creation through completion.

3. Construction-oriented developmentalism, political regionalism, and reclamation projects

Korean scholars often view large-scale construction projects from the perspective of construction-oriented developmentalism, as described by the Korean geographer Park Bae Gyoon. Others view the large-scale construction project like the SRP which is located in the southwest region of the Korean peninsula as a territorialized, political regionalism. The location of the SRP in the southwest region has important implications for its implementation. One chapter in this special issue introduces the SRP from the viewpoint of political regionalism. Here in the Editorial, I argue that the SRP can probably be validated as a combined outcome of both construction-oriented developmentalism and political regionalism. In a broad sense, developmentalism in Korea functions as an ideology of economic development which has been embedded as a pivotal process for the country's modernization. In the SRP, developmentalism in a sense of economic development, can be narrowed down to an economic development to be achieved through a construction-oriented development. Economic development and political democratization have been regarded as the two key attributes to achieve the modernization of Korea. Although Korea has achieved a fair degree of industrialization and