Making Passenger Inland Waterways a Sustainable Transport Mode in Asia: Current Situation and Challenges

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Abstract: The dense networks of rivers, canals and lakes have long served as the lifeblood of Asian countries. Boat transport used to be dominant, but have been declining for many years. In the wake of climate change adaptation, sustaining and further developing waterway transport is an opportunity to achieve sustainability in Asia. This study attempts to explore and understand the historical roles, potentials, recent trends, issues and challenges of inland waterway transport in the region. The preliminary results show that various water-based cultures do exist. Though quite many places find themselves having turned away from waterways towards highways, some cultures still see the popularity of boats. To promote passenger boat services, some key issues must be addressed, including low safety, discomfort, short service time, and poor accessibility to boat services. Governments need to realize the water lifestyles as a valid cultural accomplishment and hence change their mindsets in formulating long-term development strategies.

Key Words: inland waterway transport, boat service, water-based cultures, indigenous transport in Asia

1. INTRODUCTION

Asia-Pacific countries are naturally endowed with extensive networks of rivers, lakes and canals. Such water networks are the lifeblood of Asia because for thousands of years the major waterways of Asia have been used to transport the people, livestock and cargo. They are also a ready source of food and freshwater for people and animals. The inland waterway transport (IWT) actually possesses some key advantages. It is an environmentally friendly mode, can help to reduce road traffic congestion, significantly saves travel time, and reduces air and noise pollution. Furthermore, the diversion of traffic on waterways transport will provide a relief to roads and railways in high density areas. If well combined with road and rail systems, inland waterway transport will provide an efficient transport infrastructure with high mobility, flexibility and cost effectiveness.

Historically, waterway modes, such as boats, canoes and ships, have been operating for centuries in cities and areas in Asia. According to the definition of indigenous transport modes by Susilo et al. (2009), water modes, especially boats, are of the first indigenous modes in Asia. At first, the locals developed boats to suit the local conditions of extensive rivers and canals networks, and this mode then served as a cultural artifact that provides continuity of past to present. However, the invaluable contributions of these modes in easing congestion tend to be
ignored and suppressed as a consequence of the overrated importance of motor vehicles in transport planning and practice in the region.

In Asia, various cities have been facing population explosion and rapid increase in travel demand, which cause the increasing congestion on the existing road and rail corridors. To solve this problem in the long term, it is urgently required to search measures to decongest and stabilize the systems. In this context, passenger waterway transport facility will provide an effective alternative mode of mass transport systems on a sustainable basis and at an affordable cost to the passengers.

In the literature, there have been a few studies on passenger IWT despite its long history, important roles and vast potential in the region. There lacks of understanding on the overall trends and the prospects of the region’s passenger IWT systems in the face of climate change adaptation. This study attempts to explore and understand the historical role, the trends, the future potential, and the issues of passenger IWT in developing Asian countries. The results of this study may provide useful information for the design and planning of future transport in Asia-Pacific region.

The main objectives of this study are, first, to document the presence of passenger IWT systems in selected Asia-Pacific countries. Second, it is to identify the role of passenger IWT in climate change adaptation and its potential for mainstreaming into policy context. Finally, it is to explore the wider socioeconomic and environmental impacts of passenger IWT in the developing countries.

The method to conduct this study is, in principle, based on extensive literature review, secondary data collected from various sources, and original surveys and observations when necessary. The initial step of this study seeks to collate and assess existing materials on the topic, such as transport issues of water-based communities, inland waterway modes native to a particular contemporary context, and traditional knowledge on local transport history of particularly areas.

Chapter two reviews the existing systems of rivers and canals and their historical role in Asian countries. The next chapter examines the current development and operation of passenger transport on selected inland waterways in Asia. Issues and challenges of the conservation and further development of passenger IWT are also summarized. The last chapter presents concluding remarks and introduces further works in this research.

2. OVERVIEW OF WATERWAYS AND THEIR HISTORICAL ROLES IN ASIA

2.1. River systems in the first civilizations of Asia

The essential ingredient to any viable civilization is access to water, namely oceans, rivers, canals, lakes and ponds. Nearly all the great civilizations around the world grew up around water because the watercourses provided the key not only to freshwater supply, but also to agriculture, trade, transport and defense. In Asia, the first civilizations in China and India developed in the vicinity of Yellow River and Indus River, respectively, because these river systems provided their population with the means to both survive and expand. In the Indus River’s region, the economy depended significantly on trade and trade was facilitated by major
Advances in transport technology, including bullock carts and boats. A massive network of rivers, dredged canals and docking facilities was discovered to be used for irrigation and transportation purposes. It is no doubt that the major river systems formed the base for the continuous development of human cultures, and boats were the first means of transport used for daily travel of the ancient people in Asia.

Luckily, Asia is generously endowed with navigable rivers, lakes and canals. As shown in Table 1 (CIA World Fact Book, 2010), China has the longest waterway network system in the world (110,000 km), Indonesia ranked fifth (21,579 km), Vietnam in seventh (17,702 km) and India in ninth (14,500 km). The total navigable length of rivers, lakes and canals in Asia-Pacific region exceeds 280,000 km. On these inland waterways, more than 1 billion tons of cargo and 500 million passengers are transported yearly (UNESCAP, 2001). Some of the waterways have enormously contributed to national, regional development and people’s daily lives, such as Yangtze and Pearl Rivers (China), Mekong River (Southeast Asia), Chao Phraya River (Thailand), and the Red River (Vietnam). The inland waterways also play a vital role in the economic development of remote and rural areas and in the welfare of the inhabitants, who are usually among the lowest income groups. In the absence of river and other forms of IWT, many remote communities in Asia would be inaccessible or too costly to service by other modes.

UNESCAP (2001) revealed that there are 15 countries in the region where IWT system plays a significant role in transportation. Of which, three countries have the share of the total freight tonnage moved by IWT exceed one third, including Bangladesh (35%), Laos (35%), and Myanmar (48%).

Table 1 Waterways, paved roads and railways in selected Asian countries, 2010

<table>
<thead>
<tr>
<th>World ranking in waterways km</th>
<th>Asian countries</th>
<th>Waterways km</th>
<th>Paved Roads km</th>
<th>Railways km</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>110,000</td>
<td>NA</td>
<td>77,834</td>
</tr>
<tr>
<td>5</td>
<td>Indonesia</td>
<td>21,579</td>
<td>258,744</td>
<td>8,529</td>
</tr>
<tr>
<td>7</td>
<td>Vietnam</td>
<td>17,702</td>
<td>125,789</td>
<td>2,347</td>
</tr>
<tr>
<td>9</td>
<td>India</td>
<td>14,500</td>
<td>NA</td>
<td>64,015</td>
</tr>
<tr>
<td>11</td>
<td>Myanmar</td>
<td>12,800</td>
<td>3,200</td>
<td>3,991</td>
</tr>
<tr>
<td>12</td>
<td>Papua New Guinea</td>
<td>11,000</td>
<td>3,000</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>Bangladesh</td>
<td>8,370</td>
<td>22,726</td>
<td>2,768</td>
</tr>
<tr>
<td>24</td>
<td>Laos</td>
<td>4,600</td>
<td>4,811</td>
<td>0</td>
</tr>
<tr>
<td>27</td>
<td>Thailand</td>
<td>4,000</td>
<td>NA</td>
<td>4,071</td>
</tr>
<tr>
<td>31</td>
<td>Philippines</td>
<td>3,219</td>
<td>21,677</td>
<td>897</td>
</tr>
<tr>
<td>37</td>
<td>Cambodia</td>
<td>2,400</td>
<td>2,977</td>
<td>690</td>
</tr>
<tr>
<td>39</td>
<td>North Korea</td>
<td>2,250</td>
<td>724</td>
<td>5,242</td>
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<tr>
<td>45</td>
<td>Australia</td>
<td>2,000</td>
<td>341,448</td>
<td>37,855</td>
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<tr>
<td>47</td>
<td>Japan</td>
<td>1,770</td>
<td>961,366</td>
<td>26,435</td>
</tr>
<tr>
<td>50</td>
<td>South Korea</td>
<td>1,608</td>
<td>80,642</td>
<td>3,381</td>
</tr>
</tbody>
</table>


2.2. Water-based cultures and popularity of boat transport

In Asia, many cities and regions have long tradition of the culture of residing and moving along
rivers, canals and lakes. An interesting case is the Mekong Delta, a lower basin of the Mekong River located in the South of Vietnam. This delta is a unique human environment, where life for 17 million people centers on a vast and intricate system of rivers and canals (Figure 1). The delta possesses the densest river and canal network in Vietnam, with the density of 0.61 km/km² (VIWA, 2008). The majority of the population lives along the banks of freshwater courses in a pattern of continuous ribbon-shaped settlement. Confluences form the heart of settlements where markets, religious institutions, and administrative buildings cluster. Settlement is open, solidarity loose, and mobility high. A large, continuous floating population reside, work, and move around the network of waterways in a rich variety of boats and floating structures. Such settlement patterns had developed for hundred years, when trade made waterways the hubs of human activity and waterborne transport as dominant.

![Figure 1 Dense network of waterways in Mekong Delta, Vietnam (Source: VIWA, 2008)](image1)

![Boats at a floating market](image2)

![Boats used for going to work/visiting friends](image3)

Figure 2 Multiple use of boats in Mekong Delta, Vietnam

In the delta, stilt houses raised high on melaleuca poles have been the principal form of residence, especially in highly flooding areas. For six months in the year, a large proportion of the peoples in western part of the delta travel by boats only because roads are so poor. The region’s road network is among the poorest in the country; many provinces have the percentage of communes with vehicle-accessed roads to commune centre falls below 30%, such as Can Tho city (27%). The inadequate road infrastructure has made waterways a major mode of transport, carrying about 70% of the region’s total goods and passengers (WIVA, 2008).

Boats are the most popular transport mode in the delta. The locals find boats the most effective and high mobility mode of transportation considering the natural conditions. Every household owns at least one boat for their daily travel. Boats are used for various purposes, such as going to rice fields, visiting friends, shopping and transporting goods to and from markets (Figure 2). In fact, roads and highways have been continuously upgraded to improve vehicle’s mobility for
many parts of the delta, but the role of the boats still remains. Today, boats become even more attractive for tourists, especially foreigners, as it has constituted an important part of the region's water lifestyles.

The a-like water cultures are prevalent in other countries, for examples, China, Cambodia, India, Indonesia and Thailand. In Cambodia, the Sub-basin of Tonle Sap River provides another interesting case. The villagers live in floating timber houses and relocate as the water level changes dramatically from +1.00m in April to +9.00m in September every year (IDI, 2002). Fishing and planting rice are the main sources of locals’ income and the locals rely on water transport throughout the year. During dry season the villagers use a series of canals that link villages together.

2.3. Rivers and canals in the city, an urban cultural heritage of Asia but deteriorating

The history of city development have seen many Asian cities, such as Tokyo, Seoul, Bangkok, Hanoi, HCMC, and Phnom Penh, having their first civilizations founded at water intersection areas or confluences. However, over time almost the cities have turned away from watery origins and waterways network during their development of modern days.

One example is the case of Bangkok city. The old city of Bangkok was founded in 1782 on a loop in the Chao Phraya River. A network of man-made waterways known as klongs had been continuously built and expanded until the 1920s. Bangkok was, therefore, known as “the Venice of the East” due to the thousands and thousands of miles of klongs (Figure 5). In the past, most transport was made by boats on these waterways, and houses were built along the greenery canals and rivers, which is still found in some areas of Bangkok today (Bangkokinsights.com).
In the 20th century, Bangkok is a city that has substantially turned away from its ports and watery origins. In the last 60 years, a lot of klongs have been filled in or covered over to make way for roads and buildings. Some klongs do exist but are often much polluted with bad smelling black water. Chao Phraya River still surges with life, but the intricate network of canals is now hidden, neglected and in decay. The city has experienced out-of-control growth, with skyscrapers rising along highways and traffic clogging the streets. This situation is caused by the limited capacity of the road network, despite the continuous and expensive extension, and the rapid growth in private motor vehicles.

A similar case is Ho Chi Minh City (HCMC), Vietnam. Rivers and canals have always been its primary mode of transportation since the 17th century. Despite the continuous development of roads and highways, the utilization of abundant waterways and their sub-systems in the city have changed little over time. This unique urban life, with its water-based socioeconomic structures that include port-boat-market activities and canal handcraft villages, processes a rich cultural and religious diversity that dates back to the history of the city itself (Hanh, 2006). Geographically, HCMC is on the lower section of the Dong Nai River in the South of Vietnam. Canals used to be main transport routes. The long historical interlacing canal network in HCMC has signified a very strong urban form for this dynamic city (Figure 6).

![Figure 6 HCMC Map in 1815 and Saigon River flowing through the city center today](Source: [http://en.wikipedia.org/wiki/Ho_Chi_Minh_City](http://en.wikipedia.org/wiki/Ho_Chi_Minh_City))

Transport system in HCMC has changed drastically. To respond to the natural conditions (i.e., dense networks of rivers, canals, swamps, and ponds), boats were commonly used as “vehicles” in the beginning. Roads were then constructed to accommodate horse- and human-pulled vehicles. In the late 19th century, with the introductions of bicycles, motorcycles and cars, the road system was upgraded to a new level with highways and boulevards. Actually, the roads were first chocked with bicycles in the 1980s and then were replaced by motorcycles and cars jamming up the major roads of the city. The structural change, namely water-road-highway, is a common phenomenon of any water-based civilization.

While the road systems in such cities are struggling with the ever increasing road traffic volumes, the question is whether it is possible to invest in the use of the waterways, the long traditional and sustainable mode, and how the waterways can be adapted in a new context of rapid urbanization and modernization in Asia’s megacities.
2.4. IWT, a low cost, energy efficient, low emission and environmentally friendly mode

IWT is clearly proved to be one of the oldest indigenous transport modes. It is also an economically and environmentally sustainable mode of transportation in Asia. In addition, it plays a vital role in regional development, especially for remote rural and flooding areas. For example, nearly 4 people in Cambodia or one third of the nation’s population lives beside the Mekong River and their lives depend heavily on IWT. In China, Chang Jiang River (5,800km long) has been extensively utilized for transportation and for facilitating economic development of areas along the river. In Japan, IWT is used for tourism and transporting emergency materials in case of disasters (Ikeda, 2007).

Cost of moving a passenger 100 km (US$)    Cost of moving a ton of cargo 100 km (US$)

Figure 7 Cost comparison between river, road and rail transport (Source: BECEMO, 1994)

Energy used (MJ)  Ratio of CO2 emitted

Figure 8 Energy use and CO2 emission for moving one ton of cargo 1 km (Source: International Navigation Association, 1999; Ikeda, 2007)

While the potential role of IWT is considerably dependent on the specific regional context, such as geographical conditions, level of road development, and socioeconomic conditions, IWT has key advantages as follows. First, it is a cost effective alternative to road transport since the waterway network already exists naturally and often required no or little improvement to be functional (Figure 7). Second, it can help reduce isolation of rural areas as IWT, in some areas and sometime, provides the only viable means of transport to access to vital services like schools, health centers, markets and government services. Third, it contributes to the enhancement of economic opportunity, such as jobs provided in boat building or for the poor to access employment in cities while living in less expensive outer areas. Finally, it can be an environmentally friendly, energy efficient and low-emission transport mode (Figure 8). In conclusion, IWT can play a key role in establishing sustainable transport systems in the future of Asia.
Despite its vital role and comparative advantages, IWT systems have not yet reached their full potential in Asia-Pacific region. It has been neglected and remained outside the mainstream transport and development planning, often overshadowed by other sectors such as road transport. It has also been suffered from a lack of adequate investment over many years. Now it is time to realize the role of IWT by improving its service quality.

3. ISSUES AND CHALLENGES OF PASSENGER IWT IN ASIA

This chapter summarizes issues and challenges that face the conservation and further development of passenger IWT systems in Asia through some case studies.

3.1. Passenger IWT in urban areas

Express boats service on Chao Phraya River, Bangkok

As early mentioned, Chao Phraya River 370km long is the main river in Thailand, starting the north running down to the south through the middle of Bangkok metropolitan region. It is the backbone for both passenger and cargo water-based transport in Bangkok. The main reason why this river still operates an extensive public boat transport system is because the road system is often congested; to go from the north (Nonthaburi) to the south (Sathorn) of Bangkok Metropolitan Region, it takes only 50 minutes by boat, but by bus it may take around 2 hours. On the river, passenger boat services are operated by both public and private sectors. The Chao Phraya Express Boat Co., Ltd., a public corporation, operates regular boat services along a route of 21km with 38 piers. The boats operate every 5-10 minutes during peak time and 20-25 minutes during off-peak period. There are a number of different classes of boat based on the number of stops, capacity, and fare or the length of the route (Table 2, Figure 9).

<table>
<thead>
<tr>
<th>Item</th>
<th>Value/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route length</td>
<td>21km</td>
</tr>
<tr>
<td>Number of Piers</td>
<td>38 piers</td>
</tr>
<tr>
<td>Frequency</td>
<td>5-10 min. (peak time); 20-25 min. (off-peak time)</td>
</tr>
<tr>
<td>Daily ridership</td>
<td>35,000-40,000 passengers per day</td>
</tr>
<tr>
<td>Four boat categories:</td>
<td></td>
</tr>
<tr>
<td>(1) Local line (no flag)</td>
<td>Capacity: 90 pass.; Stop every pier; Fare: 9-13 Baht</td>
</tr>
<tr>
<td>(2) Orange flag</td>
<td>Capacity: 60 pass.; Stop at main piers; Flat Fare: 14 Baht</td>
</tr>
<tr>
<td>(3) Yellow flag</td>
<td>Capacity: 150 pass.; Stop at main piers; Fare: 19-28 Baht</td>
</tr>
<tr>
<td>(4) Green-Yellow flag</td>
<td>Capacity: 60 pass.; Stop at main piers; Fare: 12-31 Baht</td>
</tr>
</tbody>
</table>

(Note: 1 Thai baht = 0.033 U.S. dollars)


Figure 9 Express boats operated on Chao Phraya River, Bangkok
Santoso et al. (2010), through a questionnaire survey, found that the majority of the users are university students (36%) and government employees (22%), as seen in Figure 10. These users belonged to low-income classes, with monthly salary less than US$450 (Figure 11). On service attributes, though travel time and comfort are perceived as the most attractive factors, there are a number of service attributes/factors of low quality (Figure 12). First, safety is the most concern of the users; they worry about the risk of accidents while embarking or disembarking the boat. Second, comfort level is actually still limited because the boats are not equipped with air conditioned and glass windows to protect passengers from heavy rains and cold/hot winds. Third, service time is limited since the boats cannot operate at night due to limited visibility and inadequate lighting at piers. Fourth, intermodal connections with other modes remain as a key challenge because the majority of passengers usually transferred to/from by other modes, such as public bus, sky train, motorcycle, and taxi. Improving this factor would attract more users. Finally, accessibility also remains a problem since accesses to piers are currently narrow, smelly and dirty. Walkways that connect boat terminals with concentrated socioeconomic activities (e.g., shopping centers, offices, hotels and landmarks) along river seem important and shall be provided to attract middle class people in the future.

Generally speaking, the respondents generally perceived the boat service as fairly good given its relatively low fare and the chronic road congestion in Bangkok (Figure 13). This case can be one of the successful public waterway transport systems in Asia and can serve as a good lesson for other cities and countries.
Proposed waterway bus service in Ho Chi Minh City

As mentioned, HCMC has a vast potential of inland waterway transportation for both passenger and cargo because the city is naturally endowed with a redundant network of rivers and canals, which connect the city center to suburbs and satellite cities. But, recently just several cargo waterway routes have been operated between HCMC and surrounding cities; passenger transport on waterways has not been started yet. To grasp the potential, a waterway bus network was submitted to the city’s government in the late 2010. It is expected that the project, if implemented, will reduce road traffic loads, and hence significantly mitigate the chronic traffic congestion in the city (Daily Company, 2010).

As reported by Daily Company (2010), there is a number of issues that challenge the development and operation of the waterway bus routes. First, there is lack of waterway infrastructure, such as piers, docking facilities, and signal system, because there has been so far no such a public river boat service in the city even though the boats have been long used by the locals. Also, there is lack of financing source for purchasing motorized boats that suit the conditions of rivers, and being fast and safe. Second, fare regulation would be another issue; fare should be set at levels so as to cover the initial cost and to reduce the burden of the future users. Third, because HCMC is also known as the motorcycle-dependent cities in Asia (Tuan and Shimizu, 2005), breaking the habit of motorcycle use and then shifting motorcycle users to waterway bus service may be the most difficult task. The improvement of public road-based bus services in Hanoi and HCMC is perhaps a useful lesson in realizing the proposed water bus services. Finally, river management is an additional issue; rivers are now either administered by central, city or district authorities, creating overlapped and ineffective management. Simplified and harmonized river system management may help to facilitate the investment, operation and expansion of the waterway bus service in the future.

In conclusion, Asia’s cities with high potential of waterways transport can benefit from the successful lessons of the express boat service in Bangkok and other cities while planning and developing their own water bus systems.

3.2. Passenger IWT in rural and remote areas

Passenger IWT systems in Asia’s rural regions encounter similar issues and challenges, notably poor infrastructure, low level of safety and shortage of financing sources. The examination of rural water transportation in Indonesia illustrates this.

As Indonesia is a nautical and archipelago country, waterways play an important role in the nation's transportation, especially in remote places that are unreachable by road transportation. In Asia, Indonesia has the second most extensive waterways network, with 21,579 km in total. In 1999, the modal splits of passenger and freight water transport (passengers and tonnage) were 7% and 38%, respectively (Parikesit et al., 2003).

Surveys in Indonesia by Parikesit et al. (2003) found that boats are mostly private and mainly used for going to school (35%), to work (30%), and to trade (25%), as seen in Figure 14. The majority of users are aged from 25 to 35 years old and male accounts for 70% of the total users. Elderly, women and children are reluctant to use boats because of the low levels of safety and comfort. The average fare ranges from US$0.023 to US$0.05 per pass-km,
depending on travel distance and boat quality. However, the average operational cost ranges from US$0.03 to US$0.056 per pass-km, relatively higher than the average fare. As a result, passenger boats are often overcrowded because the operators, often private, try to get as many passengers as possible for faster capital return. Such operator behavior causes the increasing boat accidents.

Recent years have seen the decline in waterway transport in Indonesia due to the modal shift to land transport (Parikesit et al., 2003). To sustain and enhance the use of waterway transport, a number of issues were identified. First, it is required to provide better and safer infrastructure, such as piers and boat docking facilities, to attract more women, children and the elderly. Second, safety of boat transport must be improved immediately through providing safety standards and regulations. Finally, the government should change their mindset by paying significant attention to waterways transport and provide increased investments in this sector. Another problem is the percentage of motorized boats is still low in Indonesia’s rural areas. As Figure 15 shows, South Sumatera currently has only 45% motorized boats out of its total boats. The locals really need to upgrade their boats to accommodate their increased travel demand (i.e., more trips per day and longer distance) and to secure safety. They need financial and technical supports from the government and international donors to improve their waterway transportation.

3.3. Waterways or Roads – an examination of stakeholder views in Vietnam

Unfortunately, water-based lifestyles, the unique landscape of Asian countries has been changing dramatically in recent years as the result of the accelerated expansion of road infrastructure. Mekong Delta, Vietnam represents a typical example. The developments in this delta are not only unprecedented in scope and expenditure, but entail a profound spatial reorientation, by which roads have come to displace rivers as the economic, social, and cultural centers of the delta. A massive program of road buildings is underway to extend and improve the network of subsidiary roads that link the delta’s provincial, district, and commune centers. As a result, the developments are bringing a structural change in the delta’s major transport corridors away from rivers towards roads. The following section presents the views of stakeholders on the development shift.
Visions and objectives of foreign donors

Most of the large-scale road infrastructure projects in the Mekong delta are funded by international donors, such as the World Bank, ADB and JBIC. In their view, the delta’s waterways have been depicted as impediments to development. Their infrastructure agenda rests on a misleading image of the delta as a “backwater”. Actually, the delta is well connected by the dense network of rivers and canals. The World Bank wanted to introduce market liberalization to the country and promote integration with the world economy. With this goal, they perceived the lack of year-round access to roads in the delta as an inhibitor of market integration, development and equity. The World Bank invested US$ 110 million in improving and upgrading national highways in the delta. The ADB justified its road-building push in terms of a post-conflict Greater Mekong sub-region, in which the market can now thrive, and trade can bring people together, where once they fought. Therefore, massive infrastructure projects, for example the 90 million Australian dollar My Thuan Bridge, were funded to connect residents of the delta to markets. Such massive road-building investments have gradually turned the locals away from the water-based lifestyle culture towards the road-based one.

Vision and targets of the governments

In Vietnam, Mekong Delta is seen as a food basket, a resource frontier, a land of promise and of development potential. Through building roads and accelerating industrialization, the central and local governments aim to augment the variety and value of the produce exported from the delta, such as rice and fish. The concern to build roads in the delta also represents an attempt by the central state to abolish “backwardness” in localities that lack self-evident symbols of modernity. It was cited that 153 of the country’s 269 communes lacking roads to their centers were found in the Mekong Delta, the nation’s socioeconomic development strategy for 2001-2010 planned to tackle these targets (VietNam News, 7 June 2003). Table 3 shows the state funds allocated to different transport sub-sectors for the 2002-2010 and 2011-2020 periods. It is clear that the investments in inland waterways have been inferior, reflecting the under-evaluated importance of this sub sector. Quite apart from being unachievable, the targets set in the development strategy actually did not realize the meaning of the water-based way of life in the delta as a valid cultural accomplishment. To fully acknowledge and utilize the potential of waterways transport, governments in Asia might need to change their mindset in formulating long-term development strategies.

Table 3 Proposed investments in transport infrastructure (Billion of current VND)

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads (incl., highways &amp; expressways)</td>
<td>245,990</td>
<td>328,530</td>
<td>30,749</td>
<td>31,918</td>
</tr>
<tr>
<td>Railways (incl., high-speed railway)</td>
<td>218,661</td>
<td>393,576</td>
<td>27,333</td>
<td>34,013</td>
</tr>
<tr>
<td>Maritime</td>
<td>20,387</td>
<td>65,000</td>
<td>2,548</td>
<td>4,744</td>
</tr>
<tr>
<td>Inland waterways</td>
<td>4,673</td>
<td>4,507</td>
<td>584</td>
<td>510</td>
</tr>
<tr>
<td>Civil Aviation</td>
<td>17,880</td>
<td>36,330</td>
<td>2,235</td>
<td>3,012</td>
</tr>
<tr>
<td>Urban transport (Hanoi &amp; HCMC)</td>
<td>195,886</td>
<td>423,595</td>
<td>24,486</td>
<td>34,416</td>
</tr>
<tr>
<td>Rural transport (esp. rural roads)</td>
<td>86,500</td>
<td>77,850</td>
<td>10,813</td>
<td>9,131</td>
</tr>
<tr>
<td>Total</td>
<td>789,977</td>
<td>1,329,388</td>
<td>98,747</td>
<td>117,744</td>
</tr>
</tbody>
</table>

(Note: 1 VND = 4.8 × 10^-5 U.S. dollars)

Local perspectives

Given the dislocations to the locals inherent in the combined foreign-national push to extend roads into the delta, one might expect that the locals would react adversely. However, the locals have considerably supported these developments. The question is how is one to account for local support for fundamental changes in people’s relationship to waterways, when the cultural values that inform local agency themselves derive from that close and longstanding relationship to water (Taylor, 2006).

The locals have rushed to claim roadside frontage for their residence and businesses. Markets, warehouses, shops, transport services, and leisure venues, which originally hugged the river banks, now follow the roads. Urban centers are joined by built-up strips that stretch along the roadside for kilometers. Crossroads and bridges have replaced water confluences as delta society’s focal point. Road vehicles, particularly motorcycles, have placed boats as the preferred means of transport. Where a road is built along a waterway, people will literally turn their backs on the rivers. Houses are reoriented towards the road. The locals’ behavior of turning away from water might be understood as coerced responses to the externally imposed changes because water has been always understood as the gift from the God. The richest people in the delta have long lived closest to the water, the towns—centers of prosperity, cosmopolitan lifestyles, and cultural diversity—grew around them. The waterways are and will be effervescent (Taylor, 2006).

4. CONCLUDING REMARKS AND FUTURE RESEARCH

In Asian countries, the prospects of waterways development as a catalyst for improving regional and community socioeconomic level are clear. The building of high-performance waterways transport systems to provide an alternative mode may be not an impossible task since Asian countries have rich experiences in constructing highways, expressways and railways. Sustainable mobility need more than energy-efficiency and low emissions to succeed, thus making use of the future waterway networks stands for smart land use and a halt to habitat fragmentation. To sustain and further develop the waterways are an opportunity to improve sustainable developments in Asia. If waterway transport is to be developed, it is easily to establish a better combination of environmental and transport initiatives. Inland waterways can significantly contribute to the sustainable transport in both cities and remote areas; it can be and will be a real choice of transport besides roads and railways.

The current work of this study may have contributed to the initial understandings of the passenger IWT systems in Asia. The current situation, development trends, wider socioeconomic and environmental impacts, and issues and challenges haven been initially explored at the current step. Preliminary results show that various water-based cultures do exist. Though quite many places find themselves having turned away from waterways towards highways, some cultures still see the popularity of boats. To promote passenger boat services, some key issues must be addressed, including low safety, discomfort, short service time, and poor accessibility to boat services. Governments need to realize the water lifestyles as a valid cultural accomplishment and hence should change their mindsets in formulating long-term development strategies.

In the next steps, surveys will be conducted to deeply explore the travel behaviors of the boat
users (e.g., factors of boat service choice against other modes, frequency and distance of boat trips) in selected cities and inter-regional boat routes. The planned surveys will be used to quantify the role of passenger IWT in facilitating mobility and access to goods and services as well as understand its role in adapting to the climate change. Experiences and lessons in providing waterway infrastructure and improving level of boat services will be drawn from case studies. Finally, the study will suggest policies for realizing the potential of passenger IWT.

REFERENCES


