XI. INLAND WATERWAY TRANSPORT

A. Overview

The region’s inland waterways play a vital role in the economic development of remote rural areas and in the welfare of their inhabitants, who are usually among the lowest of low-income groups in the region. In the absence of river and other forms of inland waterway transport, many remote underprivileged communities would be inaccessible or too costly to service by other means.

Asia is generously endowed with navigable inland waterways. Some are canals, some single rivers, while others form parts of major deltas. Some of them, such as the Ayeyarwady, Ganges, Jamuna-Brahmaputra, Lancang-Mekong, Volga and Yangtze rivers are world famous for the enormous contribution they have made to national and regional development. Others, including the Pearl River in China, the Mandovi and Zuari rivers in India, the Thanlwin River in Myanmar, the Fly River in Papua New Guinea, the Chao Phraya River in Thailand and the Red River in Vietnam, are less famous but equally important for their contribution to national economies and people’s daily lives.

The total navigable length of rivers, lakes and canals in the ESCAP region exceeds 290,000 km. On these inland waterways, more than 1 billion tons of cargo (of which China contributes approximately 70 per cent) and 560 million passengers are moved each year. Table XI.1 compares this task with the volume of freight carried on a selection of other major international waterways.

The regional inland waterway transport (IWT) fleet consists of more than 450,000 vessels, with a combined carrying capacity of 40 million tons.

Table XI.1. Comparison of ESCAP IWT task with traffic on major international waterways

<table>
<thead>
<tr>
<th>Waterway</th>
<th>Annual Freight Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ESCAP</td>
<td>Approximately 1 billion tons</td>
</tr>
<tr>
<td>Rhine River</td>
<td>101 million tons</td>
</tr>
<tr>
<td>Danube</td>
<td>30 million tons (down from a pre-conflict figure of around 90 million tons in the late 1980s)</td>
</tr>
<tr>
<td>Mississippi</td>
<td>425 million tons</td>
</tr>
</tbody>
</table>

There are 15 countries in the region where IWT plays a significant role in transportation. There are other countries which, despite having low relative usage of their inland waterways for freight transport (as compared with other modes), nevertheless have enormous volumes of freight transported on their inland waterway systems each year. In China and Russian Federation, the annual volume of freight carried by IWT is about 690 and 155 million tons, respectively. Use of the Yangtze alone is increasing at 40 per cent per annum. In some of the region’s countries, inland waterways appear to have an important role in passenger transportation. Unfortunately, there is no comprehensive data set available for the region to adequately assess the role of IWT in passenger transportation.

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109 The data were supplied by the Economic Commission for Europe.
Inland waterways’ cost-effectiveness, relative fuel efficiency\textsuperscript{110} and importance for the mobility, welfare and development of remote communities in several countries of the region is being increasingly recognized. In many instances these advantages can be gained with little or no improvement to existing waterways.\textsuperscript{111} In others, a modest level of complementary investment can significantly increase usability.

\textbf{B. Inland waterway transport development in ESCAP countries}

In general, the use of IWT in the ESCAP region has not yet reached its full potential. Inland waterways have suffered from a lack of adequate investment over many years. While year round use of larger vessels may be impeded in some channels by monsoon-related draft reductions, 24-hour use of others is frustrated due to a paucity of appropriate navigation marks.

However, a number of countries are now taking initiatives to make better use of latent capacity and making investments in IWT. Several development projects and initiatives aimed at improving IWT infrastructure and operations are under way throughout the region, despite the recent declining trend in the usage of some of the region’s inland waterways. These projects offer both economic and environmental advantages. The status and trends in the development of IWT infrastructure for selected countries of the region are provided below.

\textbf{1. Bangladesh}

Out of an overall 24,000 km-long network of rivers, canals, creeks and bodies of water occupying about 11 per cent of the total area of the country, only about 6,000 km is currently navigable by larger mechanized vessels. Nearly all waterways are natural rivers, the navigability of which is affected by river morphology and hydraulics. During the dry season from December to May, the major rivers such as the Jamuna and the Ganges recede and water depths are reduced substantially through a combination of lack of rainfall and siltation.

Of note is the fact that 72 per cent of the navigable length of the inland waterway system provides for vessel drafts of 0.91m or less during the dry season. In effect this means that navigation of the major part of the system is limited in the dry season to small vessels, of 100 deadweight tons or below.

Inland waterways are estimated to carry approximately 14 per cent of the country’s annual passenger volume and 35 per cent of its annual freight volume. Of the three surface modes, IWT has the lowest share of the passenger transport task and the second-lowest share of the freight transport task (with rail taking the lowest share of the latter).

However, there are a number of initiatives under way as a result of the recently concluded five-year plan of the Bangladesh Inland Water Transport Authority (BIWTA).

These include new progress with increased depth guarantees by purchasing 9 new dredgers, channel widening and major overhauls of BITWA’s work vessels. This is in addition to the ongoing BIWTA projects, which cover a long term dredging programme utilising 3 new dredgers. Additional new waterways are being introduced around Dhaka city to improve and expand movement opportunities. Meanwhile further new infrastructure facilities include a number of additional passenger terminals.

\textsuperscript{110} For example, a study by the American Waterway Operators shows that the distance one gallon of fuel moves one ton of cargo is 59 miles by truck, 202 miles by train and 514 miles by inland barge.

\textsuperscript{111} World Bank 2002.
In the Fifth Five-Year plan (1997-2002), IWT received a budget allocation of about US$ 104 million, or about US$ 21 million per annum, the lowest of any mode. The major share of this allocation is used to fund the annual dredging programme, which, owing to the siltation problem, involves the annual removal of more than 3.3 million m$^3$ of material from navigation channels and berth frontages. The funds allocated through the fifth five year plan will cover:

- Procurement of 9 dredgers with accessories for maintaining the navigability of inland waterways;
- Establishment of river port facilities from Munshignoj-Mirkadim under Munshignoj district;
- Development and widening of Gabkhan Khal by dredging for connecting the Dhaka-Mongla and Chittagong-Mongla waterways;
- Tidal data collection and preparation of co-tidal charts of coastal waters and off-shore of Bangladesh;
- Construction of a terminal building at Feringi Bazar, Chittagong;
- Construction of passenger facilities at Nagarbari, Protabpur, Notakhola, Kazirhat and Khairchar;
- Construction of bus and truck terminal, including infrastructure at Paturia Ferryghat; and
- Procurement of two high-powered salvage units.

The development of a river container port at Pangaon, near Narayanganj, south of Dhaka has been planned for several years. This project, initially estimated to cost US$ 80 million, was proposed for funding by the Overseas Economic Cooperation Fund of Japan and for operation by the private sector.

2. China

China, with an inland waterway system comprising more than 5,600 navigable rivers and a total navigable length of 119,000 km, has the most developed IWT subsector in the region. The majority of the country’s total length of navigable waterways is located within the courses of the Yangtze, Pearl, Huaihe, and Helongjiang rivers. The Yangtze (with its tributaries) alone has a navigable length of 58,000 km, or 50 per cent of the national total, of which 3,000 km is suitable for navigation by vessels of 1,000 dwt or more. In addition to the major rivers, there is the ancient Beijing-Hangzhou Grand Canal, with a navigable length currently standing at 1,747 km, but which is expanding annually as a result of channel regulation works.

Within the waterway network there are about 2,000 inland ports, including 85 leading ports which provide 52 berths capable of accommodating vessels of up to deadweight tonnage of 10,000. Seven of these ports each have an annual cargo throughput of at least 10 million tons. The network has some 900 navigational structures such as ship-locks and ship-lifts. Among these is the largest five-step ship-lock located at Three Gorges Dam on the Yangtze River.

China is concentrating its IWT development thrust on 5 specific areas, namely, Yangtze River, Pearl River, Beijing-Hangzhou Grand Canal, Yangtze River Delta and the Pearl River Delta. In a proposed development in Hunan province, a US$ 100-million World
Bank loan is being directed towards a US$ 220-million project aimed at bringing a greater hope for prosperity to a region where 6 million people live at subsistence level. A large part of these funds are for the provision of power generating dams, by-passing ship locking systems and a deeper waterway throughout the system permitting large vessels to undertake trade.

Meanwhile on the Yangtze (which moves 80 per cent of the country’s IWT traffic) the huge commercial and infrastructure growth taking place around Shanghai – and the vast Three Gorges project (essentially to improve electric power) well upstream will completely change the scale of permissible vessel movement – above and below the dam - and opportunities for the movement of freight and people. The project includes the construction of the world’s largest ship lock. The shiplock has two lines and five steps each line. The chamber dimensions of each step are 280 m long, 34 m wide and 5 m deep for passage of pushing convoy with carrying capacity of 10,000 tons. Total length of the lock is 1,607 m. Overall difference of upper and lower water levels is 113 m with the highest upper water level of 175 m. Total investment of the shiplock is US$ 747 million. After years of construction, the shiplock was opened for navigation on 16 June 2003.

With completion of this project, all the rapids and shoals over a distance of 430 km of waterway will be submerged to provide better conditions for navigation. Average water depth has reached 70 m, and 514 satellite positioned aids to navigation have been installed in the upper river section.

The benefits to transportation are significant. The project is expected to reduce transport cost by river barge by 37 per cent. Annual passage capacity of this river section will increase to 50 million tons. Container handling at an upper major port is expected to increase to 100,000 TEU at the end of 2003. Longer-term forecasts envisage a three-fold growth of imports between 2000 and 2010 and in container movements along the river from 850,000 to 2.6 million. Further up the river the current changes underway also envisage three fold growth in this same period.

In 2000, China also decided to upgrade the 243 km long Hang-Yong Canal, located in the southern part of China. Involving a total investment of around US$ 300 million, the project includes construction of shiplocks, expansion of the channel, and reconstruction of bridges. The canal will connect six rivers in the Zhejiang Province. It will also connect this inland waterway network with the country’s largest river, the Yangtze, through the Beijing-Hangzhou Grand Canal, which extends from Beijing to Hangzhou, the capital city of the Zhejiang Province. The project will allow 500-ton barges to sail between Hangzhou and the deep-water seaport, Ningbo, and will be used as an inland transport corridor linking the port with the largest inland waterway network in China.

The fleet of vessels plying the inland waterways now numbers 231,000, with a total deadweight tonnage of 20.67 million and a passenger seating capacity of 780,000. The average vessel size is growing; it increased by 36 per cent between 1995 and 1999.

In 2000, the cargo volume carried on the inland waterways of China reached 690 million tons and the total cargo task, measured in ton-km, reached 155 billion (giving an average trip distance of 212 km). While the cargo volume and task has been increasing, the passenger volume and task, standing at 130 million passengers and 6.35 billion passenger-km in 2000, has generally been declining since the late 1980s. Since 1990, the growth of container traffic has dominated overall traffic growth on the inland waterway system. The volume of containers carried to or from major river ports grew by 38.6 per cent per annum, from 100,000 TEU in 1990 to 1.88 million TEU in 1999. In 1999 alone, this volume increased by 84.1 per cent.

The emphasis in plans for the construction and development of the inland waterway network over the next decade is being placed on inland port development, and the construction of 20 inland river channels totalling 15,000 km in major north-south and east-west corridors and localized networks. Port development will involve the construction or upgrading of a total of 81 key ports and 159 other ports along the Yangtze, Pearl, Heilongjiang, Songhuajiang and Liaohe river systems. A total cost of about US$ 2.15 billion was invested in IWT development during 1996-2000.

3. India

Although India has inland waterways with a navigable length of 15,544 km, only 37 per cent of this length (5,700 km) is currently used for navigation by mechanized vessels. Among these navigable waterways three have been declared national waterways: the Ganges River, from Haldia to Allahabad (1,620 km); the Brahmaputra river, from Dhubri to Sadiya (891 km); and the West Coast Canal, from Kottapuram to Kollam, including the Chamakara and Udyogamandal canals (205 km). Regular hydrographic surveys, bandalling and channel marking are being carried out on these waterways in order to maintain navigability to a depth of 2 m.

The latest data available for this review indicate that 17.3 million tons of cargo were moved by inland waterway transport in 2001-2002. The corresponding transport task amounted to about 1 billion ton-km. This represented only 0.1 per cent of the domestic surface transport task of about 838 billion ton-km, as compared with 68 per cent for road and 30 per cent for rail. It is understood that the volume of cargo carried by IWT has been declining in recent years.

Constituted in 1986 the Inland Waterways Authority of India (IWAI) has a role to maximize the attractions that IWT movements can bring to this highly populated country. The government recognized ten of India’s national waterways (which make up a majority of the country’s 14,500 km water lane length) as having potential for declaration as “national” units. Three of these are being actively developed for shipping and navigation and together constitute 19 per cent of the national total navigable waterways (but 48 per cent of IWT surfaces capable of carrying mechanically propelled vessels). Two of these units are rivers (Ganga and Brahmaputra) while the third is an amalgam of canals (West Coast, Champakara and Udyogamandal). The first two named are physically linked to aid wider and or longer journey capability and service the north and north eastern part of the country.

Table XI.2. Changes in traffic on major waterways of India (000 ton)

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<tbody>
<tr>
<td>National Waterway No 1 - Ganga-Bhagirathi-Hooghly</td>
<td>998</td>
<td>841</td>
<td>715</td>
<td>335</td>
<td>411</td>
</tr>
<tr>
<td>National Waterway No 2 - Brahmaputra</td>
<td>17</td>
<td>19</td>
<td>22</td>
<td>50</td>
<td>41</td>
</tr>
<tr>
<td>National Waterway No 3 - West Coast Canal</td>
<td>752</td>
<td>1,027</td>
<td>1,112</td>
<td>1,085</td>
<td>1,164</td>
</tr>
<tr>
<td>The Goa</td>
<td>18,284</td>
<td>15,369</td>
<td>14,868</td>
<td>18,047</td>
<td>15,693</td>
</tr>
<tr>
<td>The Barak</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>20,052</td>
<td>17,257</td>
<td>16,725</td>
<td>19,525</td>
<td>17,312</td>
</tr>
</tbody>
</table>

Table XI.2 shows that traffic levels on the major waterways. The Government of India has greatly increased its national budget to support IWT development. In the Ninth National Five-Year Plan (1997-2002), the budget for IWT was increased to US$ 88 million from US$ 52 million in the previous budgetary cycle (1992-1997). The budget for the Tenth National Five-Year Plan (2002-2007) is expected to be US$ 173 million.
4. Indonesia

Approximately two thirds of the 31,000 km length of Indonesia’s IWT is navigable with the predominant “life line” uses in Sumatra and Kalimantan, where there is no rail system. IWT freight activity is anticipated to treble to 20 million tons during the current five year plan period part of which is due to natural resource development (predominantly coal) in Kalimantan.

Like other IWT serviced countries in this region Indonesia suffers from a severe lack of navigation marks and appropriate charting of the rivers to permit greater time use of the system. This has been recognized and, together with ADB, the Government of Indonesia is addressing these issues. In addition, a large number of new and upgraded cargo handling facilities are being put in place.

IWT development needs for Indonesia were identified in a 1989 study funded by ADB. They include:

- The normalization and improvement of four channels in the Kahayan, Kapuas and Barito river systems of Central and South Kalimantan;
- The improvement of the berthing facilities of Lake Toba in North Sumatra;
- The installation of 8,760 river traffic signs throughout Sumatra, Kalimantan, Maluku and Irian Jaya;
- The construction of 60 river and lake quays and rehabilitation of another 17;
- The mapping of rivers and lakes for future development of navigation; and
- The purchase and operation of service vessels in isolated and remote areas, especially in eastern Indonesia.

Parts of these projects were implemented during the Sixth Five-Year Plan (1995-1999), and it is expected that the remainder will be implemented during the current Seventh plan (2000-2004).

5. Thailand

Of Thailand’s 6,000 km of waterway, approximately 30 per cent is capable of being navigated commercially, with a further 12 per cent reduction during the dry season. Inland navigation is mainly concentrated in four river systems: the Chao Phraya, Pasak, Tha Chin and Mae Klong systems.

IWT is estimated to transport about 20 million tons of cargo annually, representing 4.5 per cent of total inland cargo volume. This is better than rail, which has a share of only 1.9 per cent, but well below road, which has a commanding share of 93.6 per cent.

Passenger movements concentrate very much in and around Bangkok with 1.5 million people per week moving by this mode. Outside of Bangkok, very few passengers are transported on inland waterways. However, in a bid to relieve Bangkok’s extreme and notorious road traffic congestion, the Government of Thailand and Bangkok Metropolitan Administration, in the early 1990s began to encourage the expansion of commuter services on the Chao Phraya River and on the main canals of the city. Three types of commuter service are provided: ferry services across the Chao Phraya River (about 60 piers are available); express boat services operating along the river between Bangkok and Nonthaburi (about 50 piers are available); and long-tail boat services along the canals (with about 30 piers
Traffic on these services peaked between 1995 and 1997 at about 360,000 journeys per day, before dropping to the present level of about 300,000 per day. Commuters form a noticeable part of this figure as well as tourists.

The north eastern region of Thailand is an integral part of the services provided by the Mekong River. This is dealt with in the next subsection.

6. The Greater Mekong River System

The Greater Mekong River System is one of the world’s great navigable waterways, but has long been underutilized because of the lack of adequate infrastructure, navigational aids and lack of consistency in rules and regulations.

An Agreement on Commercial Navigation on the Lancang-Mekong River among the four Greater Mekong Subregion countries, China, Lao People’s Democratic Republic, Myanmar and Thailand that was signed in 2000 is expected to promote substantial investment and river traffic growth.

As part of the Lancang-Mekong navigation cooperation agreement, the four contracting parties – the Governments of China, Lao People’s Democratic Republic, Myanmar and Thailand - have constructed a number of ports to support the emerging river traffic.

- China has upgraded three ports, Simao (design annual capacity, 300,000 tons and 100,000 passengers; investment: about US$ 5 million; opened for operation in March 2001), Jinghong (design annual capacity, 100,000 tons and 400,000 passengers; investment, US$ 5.7 million; opened for operation in December 2002); and Guanlei (design annual capacity, 200,000 tons; investment, US$ 4.44 million; to be opened for operation in 2004);

- Lao People’s Democratic Republic set up a new economic development zone near the Golden Triangle area, which consists of construction of the Ban Mom Port, new urban area development and bank protection. The port infrastructure was completed in 2001 and others will be completed in 2008 and 2010, respectively;

- Myanmar has designated two ports for international traffic on the Upper Mekong River in the quadrilateral agreement, Wan Seng and Wan Pong. In addition, a port at Soploi has been built with the same scale as the Jinghong Port and opened for operation in 2002; and

- The Government of Thailand is building two ports in Chiang Saen (design annual capacity, 250,000 tons; investment: US$ 4.6 million) and Chiang Kong (design annual capacity, about 100,000 tons; investment: US$ 1.6 million), both of which are expected to be completed in 2003. The private sector of Thailand has built some terminals along the Upper Mekong River in Chiang Rai Province.

The river section within the territory of China has been improved for navigation of boats of 150 tons. Nine rapids and ten scattered reefs in the section bordering Lao People’s Democratic Republic and Myanmar, which severely endanger navigation safety, were partially cut to open safe channel for boats of 100 tons. The Chinese funded project (US$ 5 million) was implemented under supervision of the Project Coordination Office composed of experts from the six riparian countries in the dry water seasons during the period March to April 2002 and December 2002 to April 2003.

In the lower Mekong, Viet Nam is undertaking a large scale IWT project in the Mekong Delta with a total investment of US$ 84 million, of which US$ 71 million is financed
by the World Bank and US$ 13 million by the Government. The project will improve two waterway routes from Ho Chi Minh City to Ca Mau and Kien Luong respectively, a distance of 662 km, with dredging, building of shiplocks and sluices and bridges, bank protection and aids to navigation. In addition, the project will also upgrade the Can Tho Port through improvement of infrastructure and provision of new handling equipment. It was started in 1999 and is expected to be completed in 2003.

Viet Nam has completed a feasibility study on improvement to the access channel of the Bassac River, a major branch of the Mekong River, to increase capacity to accommodate sea-going ships of deadweight tonnage of 10,000. The estimated capital investment would be US$ 40 million with an annual maintenance cost of US$ 30 million. The project will benefit transport for exporting rice in the Mekong Delta.

A package of projects on river improvement for navigation between Cambodia and the southern region of the Lao People’s Democratic Republic, which includes dredging, regulation of shoals, installation of aids to navigation, port construction, navigation agreement and institutional strengthening has also been proposed. Cambodia has also proposed to undertake feasibility study to build six general cargo berths at Phnom Penh Port.

The Mekong River Commission, composed of Cambodia, Lao People’s Democratic Republic, Thailand and Viet Nam, is undertaking a study to formulate a comprehensive navigation strategy and programme. The strategy and programme will cover socio-economic analysis and planning, legal framework for cross-border navigation, institutional development, safety and environment, and promotion, coordination and information. The implementation of the programme requires US$ 42.5 million over a period of seven years. The study is expected to be completed in 2003.