RURAL WATER TRANSPORT

LITERATURE REVIEW

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for the

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LITERATURE OVERVIEW

A total of 57 references and 33 web locations were identified. Geographically they were split as follows:

South Asia

South East Asia

Africa

South America

On a per country basis, by far the greatest number of reports (21) were from Bangladesh. These included the two most comprehensive studies ever undertaken of rural water transport - a two year socio economic study in the mid 1980s and a socio-technical project undertaken between 1988 and 1992.

Reports from India and China focus almost exclusively on large scale, government backed inland water transport. China has a very extensive network which is constantly being improved and updated. India has a much less extensive waterway network, but recent policies point towards attempts to make more of what is available. The subject of rural water transport is neglected.

UNESCAP has a remit to support inland water transport, but here again the focus is on large scale, formal sector operations. A report on country boats was commissioned in 1992 but was never published. More positive indications are coming from some of the countries in the ESCAP region, with recognition from Viet Nam of the importance of all forms of water transport. Cambodia stands out in its support of informal sector operations and a report from that country is one of the handful of detailed studies from outside Bangladesh.

In Africa and Madagascar, studies in Sierra Leone, Cameroun and the Niger delta are rare in providing numerical as well as descriptive information concerning rural water transport. A brief study from Madagascar hints at the potential in that country.

The position in Latin America is even less clear. Brief reports available from Peru indicate the importance of water transport to the peoples of the Amazon, but provide limited information for analysis or policy formulation.

Rural water transport in Bangladesh has been studied in far more detail than in any other country. The studies date back to around the end of the colonial times. More recent work has included large projects aimed specifically at understanding and supporting the sector, as well as its incorporation into wider studies of rural access and transport. The output from the work in Bangladesh provides a number of models for studies in other countries. The information contained in the reports provides more than sufficient data for detailed social and economic analysis.

The main messages from Bangladesh are:

- the capacity of the sector is far greater than reported in official figures
- the boat operators are able to improve and mechanise their boats, but they are constrained by lack of capital
- there is a lack of official support and recognition for the sector

- the operators are frequently harassed by officials and the authorities
- the condition of the waterways and landing facilities needs to be improved
- the sector is seen as backward and increasingly irrelevant to development, so it receives very little investment

While studies in other countries have been much less extensive, it is noticeable that many of these issues, especially the lack of official recognition, recur time and again. For example, there was a clear tendency for the reports on water transport originating from Government Departments to either ignore or underestimate smaller private operations that provide the backbone of rural water transport. Where such operations were mentioned, the comments were frequently negative and critical of the safety and lack of regulation.

By contrast, the reports from other sources were generally more positive, but the wide range of style and content makes comparison difficult. Some of the most positive were short magazine articles aimed at travellers and tourists. The ability to access remote places and provide a tranquil mode of travel makes rural water transport especially appealing to this audience.

Because the social context of RWT is firmly rooted in the informal sector and neglected by government, the owners, operators and users of the services tend to have only weak influences on policy. However, there are encouraging signs in several countries of increasing organisation, with groups coming together to help make their voice heard.

On a more practical note, the reports showed that the most common construction material for boats remains wood, be it in Peru, Madagascar, Viet Nam or Bangladesh. However. increasing shortages (and associated high prices) of wood were a frequent observation. In most places, small canoes (with a capacity of two or three people) are made from 'dugout' logs, although in parts of Africa this technique is used for much larger craft. Generally though, larger wooden boats are built from planks, stiffened with frames. The technique may be 'plank first' or 'frame first' depending upon the country.

An overwhelming majority of rural water transport vessels are propelled either by human power or by engines. Sail propulsion is now rare, although ti was significant in Bangladesh until very recently.

Human propulsion (rowing, paddling or poling) tends to be restricted to small family owned vessels, with mechanisation playing an increasing role in commercial operations.

None of the references other than the socio-technical study from Bangladesh described the outcome of projects or initiatives designed to improve the situation or operational effectiveness of rural water transport. With this one exception, all the work to date has been descriptive and diagnostic studies of how things are, accompanied by recommendations for change in a few instances. Reports of implementation remain elusive.

With the exception of Bangladesh therefore, the available information only provides a limited basis for understanding the social context or economic performance of RWT and consequently is of limited value for informing policy.

LITERATURE REVIEW

SOUTH ASIA

BANGLADESH

Jansen, Dolman et al. 1985

Only available in the format of a book published using most of the material from the original report.

This is arguably the most comprehensive study ever undertaken of rural water transport (the so called country boats in Bangladesh.) Unusually for projects of this time, the team was made up entirely of people with a sociological background. As a result the book covers a very wide range of issues and places a high priority on understanding the social and economic position of the boatmen as well as the more technical issues of boats types, construction etc.

This comprehensive book provides a model for further studies. The chapter headings alone provide an excellent structure for work in other locations and they are summarised below:

Context

Development and aid

The Transport Sector

History, other modes, policy and planning

The Changing River System

Navigability, changes over time, problems and possible solutions

The Boats and Boat Builders

Numbers of boats and types. Construction and costs. People and skills.

Country Boat Operations

How much and what is transported and by whom? Types of operations and commercial relationships. Operational issues and income/costs.

Boats as a Place of Work - The Position of the Boatmen

What they do, how it is organised and what they earn.

The Boast as Private Enterprise - The Position of the Owners

Ownership patterns and income distribution. Management structures and regulation.

The Issue of Competition: Country Boats and mechanised Vessels

Relationships between the sectors. Effects of government policies. Effects on boatmen's position and income.

Country Boats as a Development Issue

Position in rural society. Important as a source of self reliance.

Conclusions and Recommendations

The outcome of this study was a proposal to study ways of improving the operational efficiency of the country boats. A Plan of Operations was prepared in 1988 and the project eventually started in 1990. The output was reported in BIWTA (1994)

The balanced approach adopted in the Jansen report can be contrasted with ITDG (1985). This study focussed solely on the supposed inadequacy of the sailing systems and techniques used by the

boatmen at that time. The objective was to demonstrate improved ways of sailing. This was achieved to the extent that a typical country boat was fitted out with a sail and leeboard system that enabled it to sail towards the wind - a feat that was impossible for traditional boats. So far as is known, these "improvements" were not taken up by the boatmen. As BIWTA (1994) makes clear, by 1988 they had embraced mechanisation as the only means of survival in an increasingly competitive environment. The commercial and socio-economic context had been ignored in the ITDG project, which was instead driven by an outsiders desire to promote environmentally benign propulsion. Meantime the boatmen had to stay in work and knew that engines were their only viable option.

In the complete absence of any external inputs (save a reduction on import duty on Chinese diesel engines - a government policy decision aimed at improving irrigation) the boatmen of Bangladesh embarked on a massive program of mechanisation. In the period between 1985 and 1988 the mechanisation spread rapidly and by 1992 it was almost complete. Hundreds of thousands of boats were fitted with engines, using finance raised from within families or other local sources. The technology, which embraced a number of different layouts of engine, shaft and propeller, was developed by the boatmen's community alone.

Greenhill B, (1971)

Basil Greenhill, a government officer in what was then East Pakistan, devoted a great deal of his spare time to recording the boats in the early 50s. This book records that work and although in narrative form, it describes the day to day life of the boatmen was well as Greenhill's overriding interest, the construction and morphology of the boats.

Bolstad T., Jansen E, (1992)

This is a book of photographs of the country boats of Bangladesh. The introduction, by Eirik Jansen is drawn from his work described in Jansen et al (1985) as well as the then unpublished BIWTA (1994). The photographs clearly show the wide range of boat types and operations that they undertake.

Jansen E., Rahman N. (1991)

This work was undertaken under the broader umbrella of the RDP6 Road and Market Improvement Projects and involved visits to 44 markets to study their patterns of usage and interactions between different modes of transport. In each case, the following information was recorded:

- Market characteristics (size, number of shops etc) and hinterland its serves
- Infrastructure: Distances to main roads, other markets, schools and post office
- Road and Waterway Connections: Local roads and type, rivers and canals
- Freight rates: Representative freight rates for different modes
- Major problems for country boats: Narrative records of difficulties described by the boatmen.

In addition, the numbers of vehicles by type seen at the time of visit were recorded.

Like Jansen et al (1985), this piece of work provides an excellent model for other investigations. The results provide a wealth of data on intermodal linkages and comparisons of freight rates and block speeds as well as more general socio-economic information. It identifies many reasons for a decline in the use of water transport (which include the blocking of waterways by roads, low bridges, reductions in water levels due to irrigation and silting up of channels), but concludes that IWT is still the dominant mode of transport in the district during the wet season. Far from being an "unfortunate necessity", many people prefer to use boats when they are available.

Rahman N. (1990)

In more narrative form, this study reports the author's visits to a number of markets used by boats and his discussions with boatmen and boat users. The results cover a very wide range of issues, with particular focus on the problems faced by boats and their interaction with other modes.

Kvam R (1990)

Prepared initially as a donor briefing paper, this is a review of the background of the country boat sector in Bangladesh and the history of the Country Boat Pilot Project (BIWTA (1994)). It highlights the dramatic changes brought about by mechanisation and identifies the potential for establishing a small scale credit scheme to support the sector.

Reidar Kvam R., Palmer C., Rahman N (1991)

This report is in effect an interim report of the work described in BIWTA (1994). It describes the background to the project and summaries the results of a large investigation that was carried out. It concludes that sail improvements alone will not help the boatmen of Bangladesh. Under the title "Engines: The Future" the report then summaries the importance of mechanisation and the ways in which it has transformed life for the boatmen. Despite these positive changes, the limitations of the technology are identified and recommendations made for further improvements.

BIWTA (1994)

This two year project (referred to as the Country Boat Pilot Project CBPP) was a wide ranging study of rural water transport undertaken by a multi disciplinary team including social anthropologists, economists and naval architects. As a result it had greater technical content than Jansen et al (1985) and it was also aimed at demonstrating possible means of improving the operations of the boats as well as reporting on their status.

The report drew on the results of a comprehensive field study which involved more than 350 structured interviews plus many unstructured discussions as well as traffic counts and an additional field study aimed specifically at understanding issues related to mechanisation. This databank provided a wealth of information ranging from the social structure of the boatmen's lives through to details of freight rates and operational patterns. In parallel, the project undertook a process of technical improvement and established a boatyard facility for the work. A total of two project boats and nine "partner boats" participated in this work. The partner boats were operational country boats that remained the property of their owners. The project worked with the owners to design and install improved mechanisation systems and judicious changes to the hull structure, rudders etc. The boat owners remained with their boats and helped with the work that was undertaken. A key feature was that the changes were designed and implemented without the use of conventional engineering drawings, but by a combination of demonstration and sketching. "Learning by Doing" became an important maxim. The project boats were used to try out and demonstrate the possibilities before installation on the partner boats. After the refitting, the partner boats returned to their normal operations and follow up surveys enabled the project to track the outcome of the changes.

The project concluded that technical improvements was possible and financially vaible. The focus of a boatyard was very important as a means of bringing about the change and the project recommended that a network of "boat centres" be established. These centres would provide a basis from which to undertake further technical development in partnership with the boatmen as well as technical training, demonstration and safe havens for mooring, maintenance and provisioning. This technical content

should be supported by a credit scheme and a communication component aimed at decision makers and officials.

The project team engaged in the work reported in BIWTA (1994) used their experiences to produce a number of further reports and papers. These include:

A Rahim, A ., Gama B A Mahiuddin, G (1992)

This paper described the process that the project used to screen candidate mechanisation systems and the results achieved with those that were developed.

A Rahim, A ., Gama B A Palmer, C (1992)

This was an interim report of the project which focussed purely on the technical improvement work.

Gama, B A. (Undated)

A review of the "longtail" designs that were tested by the CBPP. Includes costs and the financial case for the additional complexity of a reduction system.

Palmer, C (1993a)

A general article reporting the position of country boats in Bangladesh and describing the effects of mechanisation and the design solutions evolved by the boatmen.

Palmer C (1992b) and Palmer C. (1993b)

This paper describes the transition from human or wind propulsion to diesel mechanisation from an energy and economic perspective.

Palmer C (1997)

A magazine article illustrated with photographs by James Blair, which describes the waterways and boats of Bangladesh for a general readership. The article discusses the reasons for the changes from sail to engine and the adverse effects of wood shortages on the diversity of the boat types.

Rahman, N (1989)

Drawing on the experiences of the study reported in Jansen et al (1985) this report makes recommendations for measures to improve the country boat operations - not only by changes to the boats but also clearance of waterways and other infrastructure changes.

Gueller P et al (1991)

This report focuses on land transport, but notes in the Summary that "during monsoon water transport allows travel and the transport of goods both cheaply and easily." and that "The prevalence and strength of water transport does at the very least call into question the need for all-weather roads in many circumstances." In the body of the report there is a brief discussion of the importance of supporting both water and road transport as "for many people in rural areas [the availability of waterways] is often a precondition for the use of a road." The report also highlights the importance of ensuring that road building does not interfere with water transport by, for example, filling canals or using low bridges.

Howe J and Relf C, (1991)

As in Guller et al (1991) this report focuses mainly on land transport. Annex 1, Road Related Transport in Manikganj District by J Dawson, provides information on travel patterns and costs on land, with only brief references to water transport, which include comparisons of freight costs. In Annex 2 Airey and Howe note that boat ownership is widespread and provide figures on boat numbers and usage at three key locations.

Context: The report summarises the results of different road and transport related studies, commissioned by SDC under it Rural Development Project – 6, a rural infrastructure project, carried out between 1990-91 in Manikganj District of Bangladesh. The reports summarized are: (i) Road Related Transport in Manikganj by Jonathan Dawson; (ii) An Assessment of the Distribution of Benefits Resulting from Road and Market Improvements by Tony Airey and John Howe; (iii) Seasonality and the Functioning of Road and Market Infrastructure by John Howe; (iv) The Sustainability of Road and Market Improvements by John Howe; and Institutional Integration of SEM&E under RDP-6. Another study by Jansen E.G (1991) is also mentioned in this report. The report annexes reports of all the studies mentioned in the report.

Methodology: The studies summarized in this report are based on cross-sectional analysis conducted in three areas of the district : an areas well served by motorable roads but in poor shape and therefore forms the part of the RDP-6 improvement programme; (ii) an area with only partly served by good road network; and (iii) an area with no influence of metalled road. The cross-sectional analysis provides the interim conclusions on the likely effects of infrastructure interventions by SDC on the socio-economic conditions in the district. The findings of the report are only limited to only Manikganj, a typical district with the coexistence of both land and water transport. Manikganj is a district close to Capital Dhaka.

Main Findings:

- Boat ownership is concentrated in an area that is both the most flood prone and most favoured for road access. Boat owners tend to be from middle and rich peasants;
- Ownership of bicycles, rickshaw and motorcycles is widespread along the fair-good road corridors. However, rickshaws are owned by poor-household;
- Boats' relative importance tend to decline with the expansion of road networks due to the access by motorized vehicles and blocking of canals for boat's operation that were navigable before the construction of roads (Dawson, 1990);
- Boats are the principal means of transport, both for passengers and goods, in rural areas during the rainy season. They ferry people, along with their produce and purchases, to and from the markets to the nearest bituminous road. Boats feed the upper end of the transport network by evacuating the cargo from hinterland (Dawson, 1990);
- Major markets are found to be situated on the bank of the rivers well served by boats, thereby emphasizes the importance of the waterways in the district's economy (Dawson, 1990);
- Passenger vehicles operating off the bituminous road network can not compete with the boats as their operational costs go higher with the deterioration of road condition, especially with the rise of flood waters (Dawson, 1990);
- During the rainy season the hire prices of lorry drops by some 10 percent due to stiff competition from boats (Dawson, 1990);

Conclusions:

- Boat ownership is dependent on the physical and transport geography of the area and tend to be concentrated among the middle and rich peasants;
- Expansion of road network might contribute to the decline in importance of boats;
- Boats are the principal means of transport for transporting of passengers and goods to and from the markets. Boats play a complementary role to the motorized transport in the transportation of passengers and cargo from hinterland to the point from where the motorized transport are more efficient;
- Boats are more efficient in terms of speed and costs of operation when compared with the vehicles operating on deteriorated roads;
- During rainy season inter-modal competition, especially among boats and lorries, increases and results in dropping of lorry higher prices.

Airey T & Relf C (1991)

Context: The report reports on the study conducted to assess the distribution of potential benefits resulting from road and markets improvements Rural Development Project – 6, a rural infrastructure project supported by SDC. Findings of the report are also summarized in Howe & Relf (1991).

Methodology: Investigations were conducted by interviewing villagers positioned at different distances from the roads proposed for improvement, within their 'areas of influence'. These areas of influence were established beforehand.

Main Findings: No major findings on water transport other than reported in Howe and Relf (1991)

Conclusions: No major conclusions on water transport other than reported in Howe and Relf (1991)

I T Transport Ltd (2000)

Context: It reports the findings of the ex-post study of the immediate traffic effects, including water traffic, of transport infrastructure improvements, including the excavation of canals, in the southern part of Bangladesh financed by Danida. Two districts, Patuakhali and Barguna, are covered under this study. Therefore, findings of the study are only relevant to southern Bangladesh, which is water transport dominated portion, in particular. The study reports the changes in the key indicators, of both transport providers and transport users that are drawn from the project's Logical Framework.

Methodology: Before-after surveys of project with as well as non-project infrastructures are used to assess and identify project's interventions effects. A total of 10 waterways, including one non-project 'control' waterway, are monitored under this study. Seven-day traffic counts were conducted at each of the monitoring sites on these waterways. Apart from traffic census, detailed origin-destination surveys, transport users and transport providers surveys were carried out. Data are collected in dry as well as in wet season in order to ascertain the seasonal differences. Baseline and follow-up surveys were conducted before and after the project interventions respectively. Comparison of results from before and after surveys provided the basis for assessing project's effects.

Main Findings: The main findings related to project's water transport related component are:

- Majority of the boats (83%) traveling on these canals are motorised and largely concerned with the carrying of cargo. 65% and 61% of the motorised and non-motorised boats were

found to have carried cargo respectively. They have increased to 86% and 97% respectively after improvements of the waterways. However, these changes cannot be attributed to the waterway improvements as similar trend was found for 'control' waterways. It may be due to national trend towards motorization;

- No correlation was found between the importance of the waterway and the proportion of motorised boats using it;
- The majority of the boat operators were found to won boats in the baseline survey (61% and 83% for motorised and non-motorised boats respectively). However, these proportion reduced substantially after project interventions, 47% and 63% for motorised and non-motorised boats respectively. However, it was suggested that it was an overall general trend rather than project-induced change. Majority of the operators (both in case of motorised and non-motorised boats in the baseline and follow-up surveys) used them as the main income generating activities;
- While an average non-motorised boat carried cargo between 1.8 to 2.3 tonnes, an average motorised boat carried cargo between 3.0 to 4.0 tonnes;
- No conclusion was apparent on the average number of passenger carried, average charge per passenger and per unit weight of cargo. Survey and other biases had been blamed for these results;
- There was an increase of average journey length after the improvement of waterways – 17.4 kms to 30.8 kms for motorised boats and 11.0 to 21.4 for non-motorised boats;
- Average speed of motorised and non-motorised boats increased from 9.7 to 14.4 kms/hr and 4.1 to 5.8 kms/hr for motorised and non-motorised boats respectively after the improvements;
- Males (men and boys) constitute overwhelming majority of the passengers using the boats (84% and 91% and 93% and 99% in case of baseline and follow-up surveys for motorised and non-motorised boats respectively);
- Increasing number of passengers were found to have carried cargo after the improvements of the waterways – from 25% to 58% in case of motorised boats and from 54% to 90% in case of non-motorised boats. Non-motorised boat passengers on average carried some 3.1 tonnes of cargo after the improvements compared to 1.3 tonnes before the improvements. Similar figures for motorised transport was 3.8 and 1.4 tonnes respectively;
- Average journey length for non-motorised boat passengers also increased dramatically from 6.0 kms to 22.8 kms before and after improvements respectively. Similar figure for motorised boats are 15.3 and 24.9 kms respectively;
- Wealthier classes are more likely to use motorised boat. Overwhelming majority of the boats users traveled due to economic rather than social reasons; Economic

Conclusions:

- Waterway traffic volumes show seasonal variations – in general, an increase in wet season use. The study could not isolate a pattern of increased use of waterways in wet season after improvements;
- Majority of the boats were found to be motorised. Majority of the motorised and non-motorised boats are engaged in cargo carrying;

- Transport charges of boats are lower than the rickshaw or rickshaw van;
- There was little evidence to suggest that the project's waterway interventions encouraged people to switch from roads to waterways.

Palmer, C et al (1992)

This paper draws on the results of the CBPP to highlight the importance of water transport and its linkages with other modes, mainly road. It contains recommendations for enhancing the role of RWT through measures such as waterway clearance, improvements to landing facilities and improved linkages with planning and implementation of other works.

BCBOA (1992)

Although in the form of a proposal, this document represents the views of the boatowners and the importance that they attach to the clearance and dredging of waterways.

Insight Guide and Lufthansa Magazine 9/98

Both these travel guides extol the virtues of the Kerala backwaters as a tranquil destination for responsible tourism.

SOUTH EAST ASIA

Edwards, Chris. (1990)

A description of a trip to the Mulu National Park that would have been impossible without water transport. "Rivers are the roads of Sarawak." It describes the comfortable, modern express boats fitted with air-conditioning, TV and videos!

Laos Pictorial Quarterly. (1990)

A brief article describing the importance of RWT for people who live along this tributary of the Mekong.

Harbour Dept (1991)

These reports itemise the waterways network of Thailand and the formal sector vessels that operate on it. They are silent on the subject of RWT save to note that "river craft" must be modernised.

UNESCAP (1986)

This report contains a number of papers relating to inland water craft in the ESCAP region. For most of the 150 pages, the emphasis was on large scale ferries and tug barge systems. However a paper from Bangladesh referred to the numbers and importance of country craft and BIWTA's unsuccessful attempt to introduce long tail mechanisation. The paper from Thailand (Some Information on Long-Tail Boats and their Safety Aspects) gave drawings of a Thai longtail boat but expressed considerable concern about safety. The recommendations of the group place great store by the potential for standardising design of boats and systems across the region.

Palmer C (1992a)

This study, commissioned by ESCAP perhaps as follow up to the conclusions continued in UNESCAP (1986), involved a 6 week study tour of China, Thailand, Myanmar, Laos and Viet Nam. The objectives were to review the status of country boats in these countries and to make recommendations for improvements and the most suitable designs for use on a regional or sub regional basis. In addition to information obtained from the field visits, the author's experience of Bangladesh was used to produce a section for that country and a report was provided containing information from India. (Country Craft - An Identification Study. Government of India 1990.)

This report showed the difficulties of making comparisons between countries (and of obtaining useful data from a one week country visit!) Each country report was structured under the following headings to enable inter country comparisons to be made:

Information base
Waterway network
Number of boats
Types of boats
Mechanisation
Construction materials
Type of operation and competition
Socioeconomic position
Links with officialdom
Safety record
Past, present and future.

These sections were drawn together to provide overviews of the:

Socioeconomic situation
Economics of country boat operation
Environmental impact of country boat operations
Country boat technology
Regulation and safety
Potential areas for improvement
Potential for standard designs
Implementing technical change in the informal sector

For reasons that have not been explained, the report was never published by ESCAP.

UNESCAP (1998)

Country position papers were presented from Nepal, Sri Lanka, Thailand, Myanmar, Indonesia, China, Lao PDR, Bangladesh, Cambodia, Viet Nam and India. Of these countries, the potential in Nepal and Sri Lanka did not appear extensive, but the others showed more potential. The reports from India, China, Myanmar, Lao PDR and, incredibly, Bangladesh made no mention of country boats. The Indonesian paper lists vessels of country boat size and notes that they are in private ownership, but makes no mention of them in any other way. Viet Nam both acknowledged the existence of small country craft, but implied that they were in need of modernisation. Only Cambodia acknowledged the importance of rural water transport for poverty alleviation and development of the rural economy, stating that “Inland water transport serves the population and the informal sector of the economy

necessary to the economic growth of Cambodia" and that "inland water transport serves the remote areas and gives access to the market for agricultural products. The social benefit of this mode of transportation in the poverty alleviation is undeniable."

Despite these mostly negative positions expressed in the country papers, the meeting did discuss the role of country craft and resolved to encourage "recognition and further strengthening of the role of country boats and small vessels operated by the informal sector in socio-economic development, and with particular reference to poverty alleviation in rural areas."

Mekong News (1991)

Brief (3 page) article describes a reconnaissance trip along the north Mekong towards China. It concluded that there was "very good potential for navigation improvement on the Mekong waterway."

Interim (1989)

Despite opening with "Water-borne transportation means so much to the people living in the Mekong Delta." this study focuses almost entirely on the formal sector. It contains one photograph of a canal crowded with small boats, which is simply entitled "Local transportation on the Xa No canal near Can Tho." This report is typical of the lack of visibility of RWT in official publications and statistics.

UNDP (1989)

Despite noting that "most of the delta region is accessible only by water transport." this report concerns itself solely with the formal sector IWT fleet.

UNDP (1991)

This study notes only that "in general, the inland waterways are used much below their capacity for transport." and that "by far the greater part of inland waterway traffic is carried by provincial and private interests." - perhaps a reference to RWT and the informal sector.

Vella D, (2001)

Context: Tonle Sap, a lake, dubbed as one of the two main topographical features of Cambodia. The other is the in Mekong River to which it is also physically linked. Villagers surrounding the Tonle Sap lake adapt their livelihood to the movements of the lake. The study covers the village of May Chreiy of Seam Reap Province, along the Tonle Sap Lake. The location of the May Chreiy also moves along with the movement of the edge of the Tonle Sap lake. Villagers live on small floating timber houses and their main income is from fishing the Tonle Sap. Therefore, the villagers have to rely on water transport to meet their livelihood needs. The study was aimed to obtain a quantitative measure of the role and characteristics of water transport in meeting accessibility needs of the villagers. This is claimed to be first study of Cambodian rural inland water transport.

Methodology: The study is limited to the detailed case study on only one village. Therefore, the results and conclusions are location specific. The methodology involves the collection of primary data – including traffic counts, origin and destination surveys, a household survey - and secondary data. The study results determine, amongst other, a profile of the vessels types, traffic characteristics, load characteristics and ownership trends of the boats.

Main Findings:

- Majority (77%) of the vessels are non-motorised; the most common non-motorised vessel (comprise 64% of total traffic) was a locally manufactured canoe propelled by paddle, while the second most common vessels are the motorized longboat – wooden boats with a motor and a propeller drive shaft; several means of boat propulsion methods are found in the study are: paddle/stick, hand, oar, engine and tug;
- While small vessels, small canoe and vessels propelled by paddle and stick, play a leading role in the primary transportation of product, transferring from point of production to sorting, transfer or sale, motorized vessels play a dominant role in the secondary transportation of product, transporting goods from point of processing or sorting to point of transfer or sale; Vessels propelled by oar are responsible for transporting of products for retail purposes;
- Load carrying capacity of motorized boats are considerably higher than their non-motorised counterpart: carry 51% of the total weight although only make up 20% of the vessel population; High costs and poor maneuverability limit the wider popularity, although advantageous in terms of efficiency over their non-motorised counterpart;
- Overwhelming majority of the vessels are owned by the operators themselves (88%), whilst the rest are rented; 81% of the rented vessels are rented on daily basis;
- Boat ownership is high in the study area: an average wealthy or 'medium' household owns two motorised boats and 3.5 non-motorised boats while an average poor household owns one motorised boat and 2.6 non-motorised boats. An average poorest of the poor household owns 1.6 non-motorised vessels. Therefore, household wealth has a correlation with the ownership of motorised vessels.
- While some half of the vessels (49%) travel empty, 28% and 23% transport commodities and passengers respectively. Therefore, there are inefficiencies in the operation of the vessels;
- Accessibility to services and facilities from the villages improves in wet season due to the availability of water transport as they can be accessed directly by boat. In the dry season part of the journey is to be made on poor road thereby increasing the access time;
- There is a relationship between gender and the use of different propulsion methods – men use 94% of the motorised boats. Requirement of considerable strength to initiate combustion of the inboard diesel engine might discourage women from using such mode of propulsion;
- Travel burden falls disproportionately on men – 77% of the burden in terms of time shared by men – men in an average household spend some 4 hours a day in traveling. An average household spends five hours per day on the waterways. Interestingly, women make more number of trips than their men – on average 30 compared to 25 by men. However, their average trip lengths are shorter;
- Men play a leading role in collection of firewood, non-agricultural activities and fishing, while women's main role is restricted to fishing, visiting markets and selling fish. Wealthy households spend majority of their time visiting markets and selling fish, whereas non-wealthy households spend majority of their time in fishing and fetching firewood;
- Average travel speed of vessels is 4.7 kms/h and 4.4 kms/hr in wet and dry seasons respectively;

- Overall transport efforts required for transporting commodities are 65% higher in dry season compared to wet season. This is due to the greater distances to be traveled in dry season to access facilities;

Conclusions:

- The boats serving the village use several means of propulsions. Majority of the boats are non-motorised - locally made canoe, propelled by paddle, is the most common non-motorised vessel type, while motorized longboats are the most common motorised vessels;
- Each vessel type has a particular role to play in meeting the transport demand of the locality;
- Boat ownership is considerable in the study area – 90% of the household owns at least one vessel in spite of the fact that the village appears to be poor. Ownership of motorised vessels is linked to wealth of the households – a wealthier household is more likely to own motorised boats than its non-wealthy counterpart. Overwhelming majority of the operators owns the boat;
- Load carrying capacity is considerably higher in the case of motorised boats. However, poor maneuverability and high costs restrict their wider popularity;
- Male dominate the use of water vessels with a majority participation in all areas of product transportation – primary, secondary and retail. However, females' participation in transportation the retail sector is substantial. Physical makeup of women restricts them from use of motorised vessels as they require considerable strength to initiate the combustion of the diesel engine;
- Travel burden falls disproportionately on men in the study area.
- There are certain inefficiencies in the use of vessels in the study area as large proportion of the vessels operates empty;
- Water transport plays a major role in fulfilling the transport needs of the villagers and in providing access to different services and facilities.

AFRICA

Gov Sierra Leone (1995)

This comprehensive report contains a detailed description of the existing network of water transport, which is in this case all what might be termed RWT. There do not appear to be any larger scale vessels in operation. A detailed programme of infrastructure improvements is proposed, supported by very detailed financial viability analysis and benefit allocations.

An Economic Overview provides background information on the country and then discusses the difficulty of obtaining consistent and reliable data about the boat operations. This outs in a doubtful light the accuracy of extremely detailed analyses that were undertaken. However, the consultants do note that the absence of any meaningful data in the past had meant that "the role of the IWT fleet ....had been greatly underestimated in recent years."

The next section covers sociological considerations and contains useful social profiling and a stakeholder analysis, followed by a report of stakeholder's priorities. This analysis is used to produce a practical set of recommendations for community participation.

Further sections address issues of institutional strengthening and naval architecture, navigation and licensing. The study concludes with the recommendations which are mainly for improvements to infrastructure, with some small changes to the boats (primarily the use of seasoned wood for construction.)

SADEG (1999)

Like Government of Republic of Sierra Leone (1995), this report focuses on rural water transport and sees its improvement as a key part of a process of improving life in rural areas and thus reducing urban drift. It notes that water transport has historically played an important role in the coastal areas of Cameroun and recommends improvements to the infrastructure to strengthen its role for the future.

ITC (1995)

This report provides the economic and practical case for the use of long-tail propulsion in place of two stroke outboard motors. Detailed tables of component and operating costs are provided as well as a discussion of the social and status aspects of engines and achieving technical change.

UNILAG Consult (2001)

This study examines the transport patterns of selected communities in the Akuku Toru region of the Niger Delta. This region is very poorly served by roads and the report notes that a very high proportion of trips are made by water. Capital and operating costs are provided for canoes, speedboats and engines and a number of fares are listed. The state of the landings and access are reviewed as is the level of competition on the different routes and interactions with road transport. Safety issues and access to fuel and spare parts are also covered. Almost uniquely, the issue of transport and gender is discussed.

Palmer, C (2001)

A report of an initial assessment of the potential for water transport (inland and coastal) in Madagascar. Generally descriptive in nature, this report identifies the importance of water transport on the Pangalanes coastal canal system as well as in low lying delta regions in the north of the country.

LATIN AMERICA

Bergman, R. (1990)

A revised edition of a field research on traditional economy of the shipibo community carried out in the Peruvian Amazon region during the seventies. The book presents a detailed description and analysis of the different economic activities of the shipibo: farming, fishing and hunting to meet their food needs, and other domestic activities. All along the different chapters of the book we find scattered information on different aspects of river transport: the navigability of the river, description of small vessels (peque-peque, piragua, canoe), building materials, capacity, engines preferred, and uses. Although ceramics and textiles appear as sources of economic income, there is no explicit information on how the trading actually occurs. It seems, however, that their mobility needs are reduced by the fact that traders from nearby cities reach their nearest river junction, where transactions take place.

Guerrero, Raúl (1998)

The final report was based on two case studies, one from Yanacancha Baja, in the Peruvian highlands, and one from Masisea, from the Peruvian jungle. The latter is the one relevant to river transport.

Pucallpa, in the Peruvian Amazon, is the point where river transport and land transport make it possible to communicate the low jungle with the sierra and coast of Peru. The study presents an overview of the recent changes of the riverbank and its impact on the area, the flow of vessels by type, some information on river transport services, the transport needs according to economic activities by group of people and type of boats and their characteristics.

ITDG PERU (1993)

A comprehensive study on small-scale river transport in Peru. Four case studies were the basis of the final report. The study covers the geographic and environmental aspects of the Peruvian Amazon basin, provides a historic perspective and its evolution, the legal and political-institutional framework as well as the socio-economic and technological contexts. The latter covers aspects of river transport needs of local population, existing services and infrastructure and an analysis of existing technologies, including a description of the different vessels, type of engines used and problems faced by owners and operators.

Among the results of the study is the different degree of dependency on river transport for local communities. Those living in the low jungle (selva baja) have no option but to use river transport whereas those living in the high jungle (selva alta) can opt for road transport depending on the season. The latter allowed a rather superficial comparison on the operational costs of river and land transport.

The study recommended more in depth research on the following aspects: analysis of costs, comparing them to other modes of transport; analysis of technological aspects, research on other local materials that could be used for building low-cost vessels; and analysis of river transport systems and subsystems with respect to the regional economy.

TRATADO DE COOPERACIÓN AMAZÓNICA (1986)

The proceedings of a regional seminar on river transport held in Peru. The final report presents a short summary by country of each of the themes of the seminar: role of river transport in the Amazon; experience in the design and construction of river ports; experience in the construction of vessels for river transport; river interconnection systems, canals and others; navigation by river, river signs, safety and control; other themes suggested by the participants. Participating countries were Bolivia, Brasil, Colombia, Ecuador, Guyana, Venezuela and Peru. Among the conclusions, the common problems identified during the discussions in the seminar relate to conditions of navigability, planning, design, construction, maintenance and operation of ports and vessels; and to the maintenance of navigable ways, to signal systems, to safety and control of fluvial navigation and, to training of human resources.

Pnuma (1987)

Chapter 14 makes a short review of the history of transport in the Peruvian Amazon basin. Although it refers to the different types of transport existing in the region (road, river and air transport), it provides an extensive panorama of road infrastructure in the central jungle. River transport is presented as the alternative transport option in the areas where there are no roads, with a rather

concise information on infrastructure and services. The use of 'dirigibles' appears as a cheaper option for transport, compared to that of aeroplanes.

GENERAL

Wood (1984)

This book contains travelers descriptions of journeys on the Congo, Sepik/Waghi (Papua New Guinea), Mekong, Sao Francisco (Brazil), Murray and Nile rivers.

Hilling (1996)

pp 38 to 73 are devoted to Inland Water transport. the focus is on the formal sector but the importance of smaller, country craft is recognised if not discussed in any detail.

Palmer, C (1998a)

This paper was commissioned by IFRTD to highlight the issues associated with inland water transport, in particular the informal, country boat sector. It briefly reviews what is known about activities in Asia, Africa an Latin America and draws out some common themes as well as pointing up differences between countries and regions. It lists a number of constraints on development and makes recommendations for actions to improve the service provision by the sector.

Palmer C (1998b)

This one page synopsis article draws on the material in Palmer, C (1998a) to put the case for the recognition of and support for water transport in urban settings.

WEB RESOURCES

The search and review of web resources on 'inland waterways', 'inland water transport' and 'rural water transport' did not produce much results in terms of the issues on inland water transport as a means of access and mobility for poor people.

Most of the information that was available related to developments in policy and projects in inland water transport, mainly from the perspective of trade and the transportation of goods and freight.

The main exceptions were the site of IFRTD (www.ifrtd.org) and the site of the World Bank (http://www.worldbank.org/transport/rural_tr/ruralwtr.htm). Both these sites are based on the issue paper prepared by Colin Palmer (Palmer, 1998) for the IFRTD and add little to its contents. The sites highlight the marginalisation of inland water transport in the transport sector and attribute this to a lack of knowledge and to the perception of water transport as a second-best solution. The World Bank site provides a link to a more recent overview of rural water transport in Madagascar also by the same author, which is a pictorial record of the state of water transport in the country.

ASIA

The internet search revealed a strong interest in inland water transport in India and China. The Chinese government seems to be making a concerted effort to improve inland waterways and have succeeded in securing World Bank financing for inland waterway development (www.ce.cei.gov.cn/enew/new_fi/n300ffj4.htm Also see www4.worldbank.org/projects/Project.asp?pid=P056199 for a description of the World Bank funded Third Inland Waterways Project). The investment in inland waterways has been backed by deregulation of the prices of water transportation from May 1, 2001. (http://english.peopledaily.com.cn/200104/05/eng20010405_66923.htm). The Peoples' Daily also reports government concerns with environmental degradation and the launch of afforestation programmes along major waterways (http://english.peopledaily.com.cn/200108/18/eng20010818_77600.html)

http://www.converger.com/china/ChinaTransportBriefing.htm provides a description of China's transport modes, noting that "China's reliance on rail and water as dominant transportation modes is unique compared to other major world economies."

Development of Inland Waterways has achieved prominence in India in the context of Prime Minister Vajpayee's concern with strengthening the country's transport infrastructure. The Indian perspective is that waterways offer significant opportunities for creating economic and environmentally friendly transport systems that help ease the growing pressure on other modes. The ability to utilise the full potential of inland waterways is seen to require public-private partnerships. The Indian position of Inland waterways development is available from the following sites:

http://www.ficci.com/ficci/transport/speech-trans.htm A speech by the Union Minister of Shipping to the Federation of Indian Chambers of Commerce and Industry, an apex business organisation at the Interactive Meeting on Development of Inland Water Transport in June 2001. In this speech he announces that the Cabinet has approved "a package of policies and decisions aimed at resurgence of inland water transport system with a view to make it an efficient and reliable system of transportation and to supplement other modes such as road and rail".

http://www.nic.in/most/iwtpm.html provides a letter from M Ramachandran, Joint Secretary to the Government of India to the Chairman, Inland Waterways Authority of India (IWAI) on "Inland Water Transport – Policy Framework and Strategy for Development: Further Support Measures". It outlines measures that the government hopes will help IWAI to attract private sector investment. The government has also set up an Inland Water Transport Development Council.

The policy document on inland waterways is available on the website of the IWAI http://iwai.nic.in/vsiwai/iwtpolicy.html. This site also provides an introduction to the functions of IWAI, which are mainly focused on the development of what have been designated the major waterways of India. However, the IWAI does have a mandate to take a broader look at inland water transport such as co-ordinating inland water transport with other modes of transport and conducting research in matters such as the development of craft design, mechanisation of country crafts, etc. It is highly unlikely that the Authority has either the funds or the inclination to engage in these broader functions.

The efforts of the government to promote the development of the national waterways have a mixed reception in the Indian media. The internet edition of Business Line, the financial daily from the Hindu group of publications has had several articles on inland waterways since the first meeting of the Inland Water Transport Development Council in August 2001. These have variously described the efforts of the sector to get private sector involvement at the state and national levels and negotiations for multilateral funding www.hinduonnet.com/bline/2001/08/05/stories/140571yh.htm

www.hinduonnet.com/bline/2001/08/26/stories/42671j6.htm
www.hinduonnet.com/bline/2001/10/07/stories/020771g1.htm
www.hinduonnet.com/businessline/logistic/2001/10/01/stories/0901c05c.htm

None of these articles refer to the role that inland waterways play in providing access, mobility or employment for people.

www.dailystarnews/200108/29/n1082910.htm#BODY2

is an article that describes the competition between pressure for land and the development of inland water transport.

http://www.atimes.com/ind-pak/AK30Df02.html

describes a proposal in 1999 to clean up Calcutta's old canals with a view to reducing the potential for flooding, for health reasons and as a "solution to Calcutta's chaotic traffic'.

Further south in India, the backwaters of Kerala have long carried water transport and http://www.alappuzha.com/boatraces.htm shows how the tourism potential of inland waterways is being developed.

The other web resources on inland water transport in Asia relate to waterways and their development in Vietnam and Cambodia. The World Bank in Vietnam website provides an overview of the Bank's country assistance strategy. http://www.worldbank.org.vn/wbivn/cas/cas001.htm .

Bank assistance to Vietnam includes an inland waterways and port rehabilitation project in south Vietnam, the Mekong Delta Water Resources Development Project which expected to "facilitate rural transport through improved canals, bridges and canal connected rural roads" Project Information Document, 1998 http://www-wds.worldbank.org/servlet/WDSServlet?pcont=details&eid=000094946_99031911045189

The Bank's Rural Transport II project interestingly focuses on the development of land-based transport infrastructure without any mention of waterways as a means of rural access and mobility.

http://vietnamnews.vnagency.com.vn/2001-08/14/Stories/16.htm carries an interview with Dr. Ngo Xuan Son, director of the River Transport Department under the Ministry of Transport. He notes that water transport needs investment and that while it accounts for only 2 per cent of the total investment capital earmarked for the country's transport sector, its cargo delivery makes up 30 per cent of the whole sector. He also says: "Although the growth rate of river transport is considerable, estimated at between 8 and 10 per cent, we have still failed to harness its potential for economic development."

www.goldenlandpages.com/bizmyan/infra.htm lists the navigable waterways of Myanmar, but says nothing about the levels of traffic or types of operations.

www.aseansec.org/clm/cam/c_inf3.htm provides a description of inland waterways in Cambodia (Kampuchea), but despite the importance of water transport in the country there is little information on the web about inland water transport.

http://www.sarawak.gov.my/sarawak_online/general/gen_info.html provides information on the Malaysian State of Sarawak and notes that The riverine transport system has a great significance to a large section of the population living in the interior and along the coast.

AFRICA

The information about inland water transport in Africa relate to the activities of the Economic Commission for Africa, the East African Community and the SATCC.

www.uneca.org/eca_resources/publications/RCID/transit_transport_need_&_problems_of_landlocked_countries-in_africa.htm provides a description of the major activities undertaken by the ECA related to the transit transport needs and problems of landlocked countries in Africa. The improvement of safety, security and navigation of inland waterways has been a part of ECA assistance to landlocked Central African countries. This has included assistance to the improvement of operations of inland waterways infrastructure and equipment on the Dar-es-Salaam-Rwanda-Burundi-Eastern Democratic Republic of the Congo corridor and the harmonisation of inland water legislation on the RCA/Brazaville/Pointe Noire corridor.

www.newafrica.com/eac/treaty/infrastructure.htm provides details of the East African Community Treaty on Cooperation in Infrastructure and Services. Article 94 of the treaty relates to Inland Waterways transport and calls for harmonising policy and adopting procedures that will facilitate the movement of goods between partner states.

http://www.satcc.org/docs/protocol.PDF gives the SADCC protocol on Transport, Communications and Meteorology and in which Articles 8.1 to 8.6 describe the objectives of maritime and inland water transport. However neither the SADCC protocols nor the East African treaty nor the activities of UNECA see inland water transport as a means of meeting the transport needs of rural people.

www.nationaudio.cin/news/EastAfrican/24092000/Maritime/MA13.html provides an article from the East African of Sept 18, 2000 that highlights the concern of the Ugandan Minister for Works, Transport and Communication for the safety of the lives of passengers on boats and vessels. The accidents are attributed to the poor state of the vessels and the overall lack of investment in the formal water transport sector. A more recent article (November 5, 2001) describes how eleven countries from East, West and Southern Africa, with the assistance of the International Maritime Organisation have resolved to establish modern safety regulations for inland waterways. The countries are:

Tanzania, Kenya, Uganda, Burundi, Democratic Republic of Congo, Ghana, Sierra Leone, Zimbabwe, Malawi, Chad and Congo-Brazaville (http://allafrica.com/stroies/2001111989397.htm).

http://allafrica.com/stories/20111050412.html is an article, dated November 5, 2001, from the UN Integrated Regional Information Network (IRIN)on plans to dredge two major waterways to improve long-neglected river transport in Nigeria. It illustrates the conflict between a government interested in desilting the Niger and Benue rivers to make them better navigable and the interests of environmentalists and riverine communities who see the process as destructive to the environment and to the lives and livelihoods of people.

http://www.myuganda.co.ug/quick_facts/#Water%20Transport

is a website providing information for tourists and it mentions water transport.

SOUTH AMERICA

The only information relating to South America was found at a site describing Suriname http://ourworld.compuserve.com/homepages/OPKemp/trnswtr.htm#two

It provides an overview of the waterway system and the extents of navigability for sea-going, coastal and river vessels.

GENERAL

http://www.irpt.net/ This is the site of the Inland Rivers Ports and Terminals, Inc. in Jackson, MS, USA. It provides documents on waterways, the environmental advantages of inland barge transportation, the environmental impacts of a modal shift and the economic impact of inland rivers ports and terminals which could be adapted to the study on rural water transport in developing countries.

www.bartelby.com/151/a107.html and www.cia.gov/cia/publications/factbook/fields/waterways.html provide a comprehensive list of countries and the extent of waterways. See box below for information extracted from this site for the focus countries of the study.

Bangladesh	Up to 8,046km depending on season Note: includes 3,058km main cargo routes
Cambodia	3,700km *Note: navigable all year to craft drawing 0.6m or less* *282km navigable to craft drawing as much as 1.8m*
Côte d'Ivoire	980 km (navigable rivers, canals and numerous coastal lagoons)
India	16,180km Note:3,631 km navigable by large vessels
Indonesia	21,579km *Note: Sumatra 5471km, Java & Madura 820km, Kalimantan 10,460km, Sulawesi(Celebes) 241km. Irian Jaya 4,587km*

Madagascar	Note: of local importance only
Malaysia	7,296km *Note: Peninsular Malaysia 3,209km, Sabah 1,569km, Sarawak2,518km*
Nicaragua	2,200km (including two large lakes)
Nigeria	8,575 km *Note: consisting of the Niger & Benue rivers and smaller rivers and creeks*
Peru	8,808 km *Note: 8,600km of navigable tributaries of the Amazon system and 208km of Lake Titicaca*
Tanzania	Note: Lake Tanganyika, Lake Victoria and Lake Nyasa are principal avenues of commerce between Tanzania and its neighbours on those lakes
Uganda	Lake Victoria, Lake Albert, Lake Kyoga, Lake George, Lake Edward, Victoria Nile, Albert Nile
Vietnam	17,702 km Note: More than 5149 km are navigable at all times by vessels up to 18m draft

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