Nepal

Expanding Tradable Benefits of Inland Waterways

CUTS International

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Case of Nepal

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Abbreviations

ADB:	Asian Development Bank
BBIN:	Bangladesh-Bhutan-India-Nepal
GRB:	Ganges River Basin
IWT:	Inland Water Transport
JCKGP:	Joint Committee on Kosi and Gandak Project
JCWR:	Joint Committee on Water Resources
JMCWR:	Joint Ministerial Level Commission on Water Resources
JSTC:	Joint Standing Technical Committee
LAD:	Least Available Depth
LPI:	Logistics Performance Index
MOPPW:	Ministry of Physical Planning and Works
MoPIT:	Ministry of Physical Infrastructure and Transport
MVA:	Motor Vehicles Agreement
NAIADES:	Inland Waterway Action and Development in Europe
SAARC:	South Asian Association for Regional Cooperation
SRMT:	SAARC Regional Multimodal Transport
UNCTAD:	United Nations Conference on Trade and Development
UNECE:	United Nations Economic Commission for Europe
VDC:	Village Development Committee
WECS:	Water and Energy Commission Secretariat

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Executive Summary

The perennial Himalayan Rivers that transverse the entire length of Nepal can emerge as an alternative route of transport connectivity in the landlocked country. These rivers that merge with the Ganges and ultimately reach the Bay of Bengal through India and Bangladesh could provide supplementary passage for access to the high sea. Nepal does not have any navigable river network. And, any semblance of navigation is limited to wooden boats used for river crossing.

Development of river navigation has found a mention in different policies and plans related to water resources and transport management. However, as water issues have always been dominated by energy development and transport concerns are dictated by roadways, river navigation is still waiting for a concrete and result-oriented substantive policy-level action to determine the future course of direction. Nepal has not been able to prepare a plan to develop alternatives to roadways even as potential waterways remain unexplored.

Despite the potential of developing Nepali rivers as waterways for transboundary connectivity, the present state of water transport begs the question whether this idea could be translated into reality. A lack of policy coherence, a dearth of studies on the feasibility of water transport and a general lack of interest are keeping the potential untapped.

Against this backdrop, South Asia Watch on Trade, Economics and Environment (SAWTEE) undertook a diagnostic study to assess the situation of water transport system in Nepal under Expanding Tradable Benefits of Trans-boundary Water: Promoting Navigational Usage of Inland Waterways in Ganga and Brahmaputra Basins (IW) Project with support from CUTS International.

The prospects and challenges of developing a viable water transport system in Nepal—domestic as well as cross-border—while analysing the probable impacts on livelihoods along riverfronts is discussed in the report. This report is based on the findings of a country diagnostic study, which focused on the Kosi River Basin and the Gandaki/Narayani River Basin.

Developing navigational waterways for the purpose of domestic inland transport could also be worthwhile due to its implications on the local livelihoods. At present, rivers like Kosi and Narayani and their tributaries hardly have any water transport service,

even in non-mechanized forms. But, the experience of jet boats services that were in operation till the spring of 2012 and existing steamer service on the Kali Gandaki River on a reservoir created by the construction of dam for Kali Gandaki A Hydroelectric Project in Syangja show that possibility is immense.

The narrative on transportation is dominated by surface transportation, which does not allow exploration of the possibilities offered by alternate modes. Moreover, given the gradient and high velocity of Nepal's rivers, there are numerous technological challenges related to buoyancy and depth for easy navigability. Lack of authoritative hydro-morphological feasibility studies to assess the navigability of rivers, navigability of these rivers could not be ascertained.

The convergence of Nepal's rivers to the Ganges provides an opportunity for Nepal to gain an alternative access to the sea, in theory. The current undeveloped state of rivers in Nepal does provide a space for instituting an inland waterways system with an objective of transboundary connectivity.

As water transport is considered as the cheapest and cleanest form of transport, having a cross-border navigation network connecting Nepal with India and Bangladesh could translate into lower trade costs for Nepal. However, in this case too, absence of feasibility studies poses as a hindrance.

Moreover, sorting out issues related to trade infrastructure such as integrated customs point, and procedural intricacies related to transhipment, liabilities-handling regime in a multi-modal and inter-modal system, and documentary requirements, among others is also required. Further, an absence of legal and policy frameworks on water transport has discouraged dialogue on transboundary navigation with neighbouring countries.

Despite these challenges, there is a need for Nepal to develop an integrated water transport system so that maximum benefits could be realized while causing minimal societal and environmental damages. This would entail, among others, setting up institutional mechanisms, commissioning studies to investigate the viability of rivers for navigation, preparing policies and plans, and strengthening water transport facilities in existence.

1. Introduction

Background

For a landlocked country, developing inland water transport (IWT) is prescribed as the best possible way to gain access to the sea. Switzerland in Europe, Paraguay in South America and Lao PDR in Asia have all relied upon inland waterways to expand their overseas trade (UNCTAD 2013). Nepal, which has more than 6,000 rivers with a cumulative length of 45,000 km, has a potential to use its river systems to be connected to international waters. Unfortunately, navigation in Nepal is limited to country boats used in a few stretches of rivers to enable river crossings. A lack of institutional and physical infrastructure regarding water transport has left inland navigation an untapped sector in Nepal.

Along with opening up of a new economic avenue, having well-equipped inland waterways could be invaluable for swifter and easier trade for Nepal. Moreover, it could provide impetus to seamless regional connectivity — especially in the eastern region of South Asia, which is recognised as a sub-region on its own, Bangladesh-Bhutan-India-Nepal (BBIN). The BBIN countries signed Motor Vehicles Agreement (MVA) in June 2015 which allows cross-border road transit for passenger and cargo vehicles across territories of countries (Himalayan News Service 2015). The MVA has rekindled a possibility of seamless movement of cargo in a single vehicle across countries. As a sequel to the MVA, the BBIN countries have started looking forward to a Multi-modal Transport Agreement which will encompass cross-border transit via inland waterways, along with road and rail (SAWTEE 2016).

Unlike mountainous Nepal and Bhutan, Bangladesh and India have a functional inland water transport system. Particularly in Bangladesh, inland waterways are used prominently with the IWT sector carrying over 50 per cent of all arterial freight traffic and one quarter of all passenger traffic (BIWTA 2016). Recently, India has also pledged to spend INR 25 trillion on developing inland waterways (PTI 2016). Nepal could possibly reap the benefits by getting linked through water with these countries. As all rivers in Nepal drain into the Ganges, they are a part of the Ganges River Basin (GRB). The possibility of connecting Nepal's waterways to Indian waterways would result in the opening up of new alternative trade routes. In addition, waterways are a route through which Nepal can access Bangladesh's ports, which Nepal has not used despite signing of a transit agreement between two countries. Most importantly, getting a swifter access to the sea would lower Nepal's trading costs.

Rivers in Nepal

Among the 147,181 sq. km area of Nepal, two-thirds of the land is covered by mountains and hills and the rest of the land is in the southern plains, called the Tarai. Bordered by the Himalayas in the north, Nepal's entire middle section is home to the Mahabharata and Siwaliks (known as Chure in Nepal). These ranges are sources of perennial, semi-perennial and seasonal rivers that occupy 45,000 km of landmass (Aryal and Rajkarnikar 2011). All large and small rivers originate in the north and drain southwards entering India ultimately to join the Ganges River. The cumulative drainage area of these rivers is up to 191,000 sq. km, of which 74 per cent lies within Nepal's territory (Aryal and Rajkarnikar 2011). The total water draining from Nepal to the Ganges River is about 270 billion cubic meters, which is 55.8 per cent of the total amount of 464 billion cubic meters of the Ganges basin (Aryal and Rajkarnikar 2011).

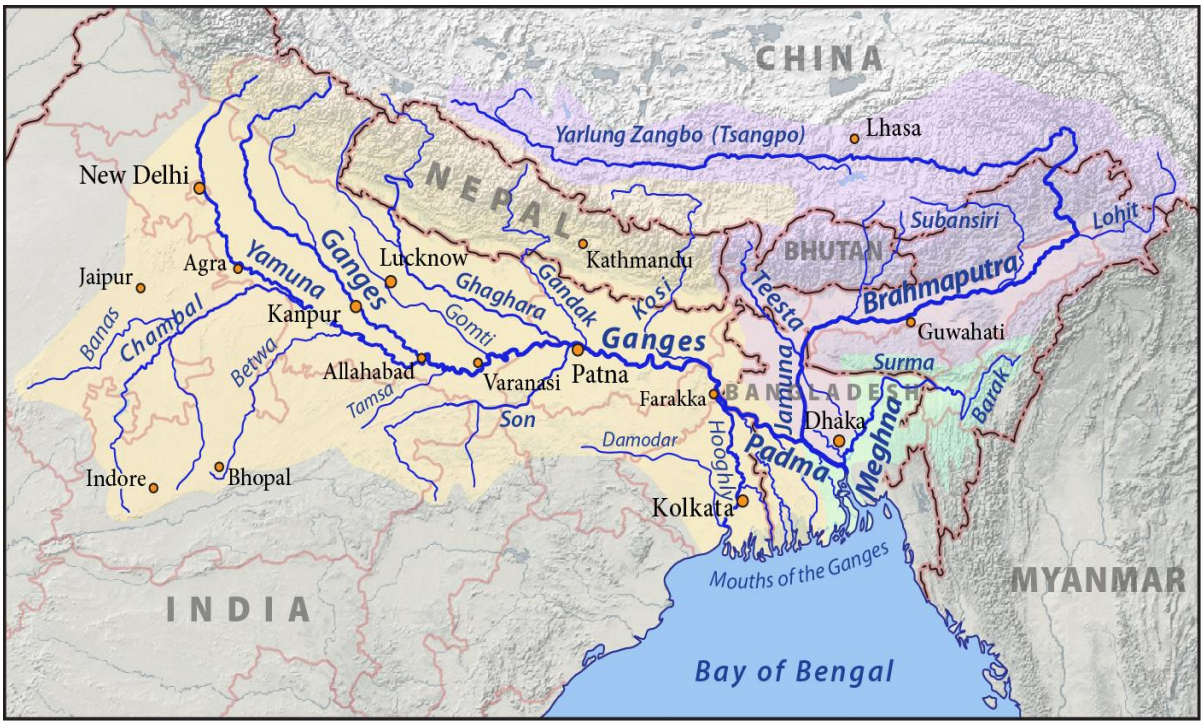
Depending on their source, Nepali rives are classified into three types (Dixit 1995). There are four snow-fed rivers originating from Himalayas that are perennial in nature – Mahakali, Karnali, Gandaki and Kosi. Then there are medium rivers that originate in the Mahabharata Range, which are fed by precipitation and springs, such as the Babai, Rapti, Bagmati, Kamala, Kankai and the Mechi. The other type of rivers are the ones originating in the Siwalik Range, which are seasonal, such as, Banganga, Tilawe, Sirsia, Manusmara, Hardinath, among others.

Table 1: River Water Discharge Flowing through Nepal

River Basin	Estimated catchment area in Nepal (sq. km)#	Average discharge (cubic m/s)	Annual discharge (cubic km/year)
Rivers originating at Himalayas			
Kosi	27,863	1409	45
Gandaki/Narayani	31,464	1600	50
Karnali	41,058	1397	44
Mahakali	5,188	573	18
Rivers originating at Middle Mountains and Hills	17,000	461	14.5
Rivers originating at Siwalik zone	23,150	1682	53
Total	145,723	7122	224.5

 # Total catchment area of each river basin is larger than shown in the table. Areas of basins excluded in the table lie either in China or India.
Source: Water and Energy Commission Secretariat 2005

Figure 1: Ganga-Brahmaputra-Meghna basins



Source: Created with Arc Explorer and Adobe Illustrator, based on Natural Earth data, 2017

Developing River Transport System

The geographical terrain of Nepal, with two thirds of its land mass comprising mountainous and hilly terrain, makes access to many parts of the country a challenge. Nepal has about 27,990 km of major road network that connects the country (MoF 2016). Road transport is the predominant form of transport as it accounts for the movement of approximately 90 per cent of all passengers and freight within the country (Pande 2012). Despite much resources being devoted to develop road networks, Nepal's road density is lowest in South Asia with 0.6 km of road per 1,000 people. Moreover, road construction is also expensive, as a kilometre of road construction costs between NPR 1.5 million and NPR 4.2 million depending on the nature of the road (The World Bank 2012).

At the same time, a lack of reliable and efficient road network has contributed to high costs. Despite these drawbacks, Nepal has not been able to prepare a plan to develop an alternative to roadways, and potential waterways remain unexplored. Nevertheless, the government's National Transport Policy 2002 recognises the importance of developing viable navigable waterways for mass transport (Ministry of Physical Planning and Works 2002).

One of the biggest advantages of water transport is its cost-efficiency. It has been estimated that adding 1,000 km of sea transport to a transport quote of US$4,620 would bring an additional cost of US$190 whereas adding the same distance of inland transport incurs an extra US$1,380 (UNCTAD 2013).

Not only maritime transport, inland water transport is also considered far less expensive than road. In India, the cost of freight per tonne km is around INR 1.41 by railways, INR 2.58 by road and INR 1.06 by inland waterways to transport the same cargo on the same route (RITES 2013). The advantages of IWT over other modes of transport is based on its superior record of safety, reliability, low costs, high-energy-efficiency, good carbon footprint, low infrastructure costs, among others (UNECE 2011).

The environmental advantages of IWT are substantial as the fuel required to move freight by inland waterways is 60 per cent that of rail and only about 15 per cent that of trucks (Heins 2016). Unlike roads, infrastructure construction cost for waterways are comparably low to road infrastructure while maintenance costs are also limited (NAIADES 2017).

Table 2: Water Transport in Comparison to Other Modes of Transport

Parameters	Waterways	Rail	Road
Energy Efficiency: 1 Horse Power can move what weight of cargo in (Kg)	4000	500	150
Fuel Efficiency: 1 Litre of Fuel can move how much freight (ton-km)	105	85	24
Equivalent single unit carrying capacity	1 Barge	15 Rail Wagons	60 Trucks
Air Pollution	Low	Medium	High
Land Acquisition	Low	High	High
Capital Required	Low	High	High

Source: Key Issues & Challenges for Inland Water Transportation Network in India (Pravin and Jegan 2015)

At the regional level as well, developing inter-connectivity through waterways has been envisaged as an instrument for deeper integration of the South Asian Association for Regional Cooperation (SAARC) member countries. The Declaration of the 18th SAARC Summit held in Kathmandu in 2014 also emphasizes waterways as one of the modes of transport through which regional connectivity could be achieved (18th SAARC Summit Declaration 2014). Similarly, SAARC Regional Multimodal

Transport (SRMT) report has pointed out that South Asia has highly underutilised its potential for waterways for intra-regional connectivity (SAARC Secretariat 2006).

Despite the presence of transboundary rivers, the region does not see any passenger movement through water and whatever freight movement is taking place through IWT is happening between India and Bangladesh and is marginal (SAARC Secretariat 2006). However, the 2006 report does not consider the potential of developing waterways in other countries but only recommends the upgrading of the existing infrastructure in India and Bangladesh. In a similar vein, the Asian Development Bank's South Asia Sub-regional Economic Cooperation Operational Plan 2016-2025 on transport has also set an objective of promoting inland water transport to handle international trade. Yet, this plan also focuses only on India and Bangladesh (ADB 2016).

Rationale and Limitations

It is evident that Nepal has not been able to exploit the potential of developing inland waterways. The absence of policies to ensure safe and profitable navigable conditions has further atrophied the prospects. In the absence of a detailed study, no authority can assert whether Nepal's waters can host viable inland waterways. Against this backdrop, this research aims to assess the state of institutions —legal and governmental—which govern inland waterways for potential trans-boundary connectivity. The objective is also to evaluate how the existing water transport services are interconnected with livelihoods of locals and in what ways would the future cross-border inland waterways expansion impact their lives.

Since Nepal does not have a strong IWT system in place, this project will also help identify gaps in policies and institutional capacity once Nepal decides to adapt waterways as an alternative mode of transport. This study ventures to find out the impact of water transport on livelihoods of primary stakeholders, especially women, in selected locations.

In the absence of a proper inland waterways transport system, river transport in Nepal is limited to country boats mostly used for river crossing, which are not transboundary in nature. Nepal and India share 1,850 km open border (Kansakar 2001) and a relatively free movement of people, but such freedom of movement does not extend to cross-border movement via rivers. The lack of navigational facilities poses a challenge for the research to tangibly assess the impact of transboundary navigation on livelihoods. Given the limited resources, this study attempts to assess impacts of

existing water transport services, irrespective of their size and scope. This study may serve as a baseline for further studies on the topic.

Methodology

This is a qualitative study where findings are mostly based on responses of stakeholders, including inhabitants of the area impacted by water transport, boat operators and community-based groups in selected locations. In addition, similar one-to-one interactions were undertaken with experts in Kathmandu, such as water resources experts, current and former officials at different government entities, and the private sector.

Among the rivers in Nepal, the study focuses on the Kosi and Gandaki River Basin, for which previous studies point out the possibility of developing transboundary waterways on these. On the Saptakoshi River, the field study took place in the area near Bhimnagar on the Nepal-India border, where country boats are in use, and up to Chatara, where jet boats operated until a few years ago. On the Narayani River (or the Saptagandaki River), the field study took place in and around the Triveni-Susta Village Development Committee (VDC) area in Nawalparasi district, which is located on the Nepal-India border. Although transboundary water transport services are not being operated in these locations at present, these locations could be greatly impacted should such services be introduced.

Structure of the Report

The report consists of an introductory chapter which covers the background of the study and the methodology adopted. It looks into existing legal and institutional frameworks related to inland navigation in Nepal. The report assesses the situation in the selected locations in terms of water transport and also delves into the feasibility of navigation in the rivers. It analyses the impact of inland navigation on livelihoods, environment and trade with a special focus on gender concerns and proposes recommendations based on the study.

2. Institutional and Legal Entities Governing Waterways

Nepal does not have a dedicated legislative arrangement related to river navigation but numerous policies and laws have acknowledged the possible development of navigation in rivers of Nepal. The official strategies and policies related to water resources is developed with an objective of harnessing the available water mostly for drinking water supply, energy generation and irrigation. The lack of navigational use of water could be the cause of the absence of policies enabling the development of water transport. Or, the lack of policy-level interventions to boost navigation could have stunted the development of waterways. Only legally non-binding policies and plans have laid emphasis on developing navigational capabilities.

Nepal promulgated a new Federal Constitution in September 2015, under which Right to Water Resources have been divided between the federal, provincial and local government. As the Constitution of Nepal does not provide clarity regarding rights to river as the federal and provincial governments have overlapping rights to rivers. The Unbundling Report approved by the Cabinet has granted rights related to national and inter-state rivers to the federal government. Similarly, the Constitution has granted the federal government the rights related to developing treaties, legislation and regulations for governing national and international waterways.

Laws, Strategies and Plans related to Water Transport

1. **Water Resource Strategy 2002**

   The strategy was formulated to alleviate constraints to sustainable water resource development. Its objective is to identify effective, scientific, sustainable and consensus-based mechanisms to facilitate the implementation of action-oriented initiatives and programmes for optimum utilisation of multiple usages of water resources. The strategy identifies 'potential of water transportation' as one of the issues that needs to be addressed by the strategy.

   Likewise, the objective of the strategy is to facilitate water transport, particularly connection to a seaport. The strategy recognises the potential for initiating trans-boundary cooperation in waterways in order to gain access to the sea and aims at attaining the use of water bodies for navigation by 2027. The Water Resource

Strategy had envisaged development of navigational use of rivers. According to that plan, by 2017 necessary background work (legal, institutional etc.) would have been undertaken by the government and private investment would have started to pour in the navigation related sectors. For that purpose, an action plan was supposed to have been prepared by 2007 and the by 2017 private sector was expected to have started investment in navigation-related projects. The strategy also states that the Ministry of Planning and Public Works will explore the potential for navigation projects, including opportunities to link up with navigable rivers in India (WECS 2002).

2. National Transport Policy 2002

The policy, which was formulated in 2002 by the Ministry of Planning and Physical Works, aims at developing an organised and reliable transport system complying with international standards. Although the transport policy basically seeks to improve the road transport system of the country, it mentions waterways as a viable alternative mode of transport. The policy mentions enacting a comprehensive Transport Act to govern road transport, tunnels, railways, waterways, rope ways, cable car, airport and multi-modal transport (Ministry of Physical Planning and Works 2002).

However, in past 15 years since the policy was introduced no work has been done towards that end. It also floats the idea of inviting the private sector to create a waterway infrastructure through Build-Operate-Transfer, Build-Own-Operate-Transfer and Operate-and-Transfer models. The policy has taken into consideration a lack of legal framework to develop an inland waterways transport system. Developing such legal provisions is one of the proposed areas of intervention. Likewise, it also recommends developing a mechanism to connect domestic inland waterways with neighbouring water systems.

3. National Water Plan 2005

The plan stresses the need to give adequate attention to develop a IW transportation system for its possibility to contribute to trade expansion and industrial development. The plan has laid emphasis on constructing storage dams on rivers, such as Kosi, Gandaki and Karnali, which could open up navigational waterways in the hills of Nepal to aid navigation (WECS 2005). It points out that the total length of navigational waterways in the Kosi basin could be around 400 km; similarly, in the Gandaki and Karnali basins, the waterway lengths are around 400 and 250 km, respectively. The plan also acknowledges the technical complications regarding lack of infrastructure for navigation. However, it did not allocate any budget or set any specific target to achieve outcomes.

4. **Water Resource Act, 1992**

The Water Resource Act that governs the use of water resources ranks navigation in the sixth place among the list of water usage priorities (WECS 1992). However, the Act and subsequent Water Resource Rules 1993, which provided functional clarity to the Act, do describe the process and conditions to obtain a licence to conduct a survey for the commercial use of water resources. Besides that, it does not address any navigation-related issue.

5. **Ship Registration Act, 1971**

This Act provides a legal ground for owning ships and boats for commercial or non-commercial purpose. The Act envisages setting up of Nepal Ship Office for the purpose of registration of such ships and boats that ply the international seas or Nepali waters (Ministry of Transport Management 1971). It also spells out the ownership structure of the ships' holding companies. There is no Nepal Ship Office or any entity similar to that. However, based on this Act, two jet boat service providers have obtained a permit to operate the service on the Saptakoshi River in Sunsari district.

6. **Local Self-Governance Act, 1999**[1]

This Act has granted rights to banks of water resources (such as banks of rivers and lakes) to the local bodies such as the Village Development Committee (VDC) or the Municipality. The responsibility for maintenance and issuing permits for the usage of these banks (ghats) falls under the ambit of local bodies (Ministry of Law and Justice 1999).

In addition to the abovementioned acts and policies, water resources also come under the ambit of Electricity Act 1992, Irrigation Rules 2000 and Hydropower Development Policy 2001. Similarly, as river navigation could have an impact on river and forest ecosystems, differences could arise between developing navigation and maintaining natural balance. Thus, legislation such as Forest Act 1999, Environment Protection Act 1997 and Aquatic Animal Protection Act 1960 also intersect with inland navigation. These legislations regulate water and its related usage. If navigation is to be launched in a commercially viable manner, a separate set of legislation shall be required to address any conflict that could arise.

[1] This Act will be dissolved and be replaced by the Local Governance Act envisaged according to the new federal structure of Nepal.

Treaties related to Water Resources

Nepal has signed three treaties related to water resources with India, covering three different rivers — Kosi, Gandaki and Mahakali River (see Box 1 for details). Among these three treaties, only the Gandak Treaty addresses the possibility of navigation in the river. The Gandak Treaty mentions providing 'locking arrangements for facility of riverine traffic across the barrage free from payment of any tolls whatever.' The Kosi Treaty has only a passing mention related to possible navigation services. The trade and transit treaties signed by Nepal with India and Bangladesh do not identify any inland waterways route as a recognised transit and trade route for freight bound for or originating in Nepal.

Institutions

Although the Ministry of Water Resources ceased to exist in 2008, at present, there are quite a number of ministries that are related to water resource governance. The Ministry of Irrigation, the Ministry of Energy and the Ministry of Drinking Water and Sanitation are directly linked with water resources, overseeing different aspects of usage of water. At the same time, the Ministry of Local Development and the Ministry of Population and Environment are also responsible for rivers. However, none of these ministries cover river navigation.

1. **Ministry of Physical Infrastructure and Transport (MoPIT)**
   The authority to grant permits for operating transportation service lies with MoPIT. Thus, it is this Ministry's prerogative to grant, or not grant, license for the operation of navigation services. The Ministry has a Transport Management Division which also looks after inland navigation. However, the division has not been active in the past couple of years. The last notable achievement of this entity was to commission a feasibility study on water transport on certain rivers. Earlier, it had granted licence to two jet boat operators in Sunsari based on the Ship Registration Act. The division was in the process of drafting a set of guidelines for similar jet boat services. However, the work has been shelved until more transport operators apply for a permit.

2. **Water and Energy Commission Secretariat**
   Water and Energy Commission Secretariat (WECS), evolved from the Water and Energy Commission, was established with the objective of integrated development of water and energy resources in Nepal. WECS works with different ministries and other related agencies in the formulation of policies and planning of projects in the water and energy resources sector. WECS is also responsible for providing recommendations and guidance with regard to the multipurpose (mega

and medium scale only) projects' development as well as to irrigation, hydropower, drinking water, industrial use of water, flood management, including water navigation. It is also the entity that renders opinion, advice and recommendation on bilateral and multilateral issues relating to water resources and energy. However, at present, WECS is mostly focused on issues related to energy development. The Water Resource Strategy and Water Resources Act were formulated by WECS.

Bilateral Mechanism with India on Water Issues

The governments of India and Nepal have set up a Joint Ministerial Level Commission on Water Resources (JMCWR), of which the Indian side is headed by Minister of Water Resources and the Nepali side is led by Minister of Energy. The last meeting was held in July 2014, in which participants focussed on construction of storage dams on rivers in Nepal, but the meeting did not yield any substantial outcome. A Joint Committee on Water Resources (JCWR) is headed by India's Water Resource Secretary and Nepal's Energy Secretary.

Another joint committee is India-Nepal Joint Standing Technical Committee (JSTC). It includes head of Department of Irrigation of Nepal and chairman of Ganga Flood Control Commission and Central Water Commission of India. In addition, there is a Joint Committee on Kosi and Gandak Project (JCKGP), which is under the aegis of irrigation departments of two countries (MoI 2017). As the participating agencies reflect, committees mostly regard power generation and distribution and water sharing for irrigation and flood control as priorities. Thus, navigation has never been given any consideration in bilateral talks.

Box 1: Major River Treaties between Nepal and India

KOSI RIVER TREATY: The Kosi Project agreement was signed in 1954 between the governments of Nepal and India. It comprised a barrage, headworks and other appurtenant work about 3 miles upstream from Hanuman Nagar town on the Kosi River with afflux and flood banks, and canals and protective works on land lying within the territories of Nepal for the purpose of flood control, irrigation, generation of hydroelectric power and prevention of erosion of Nepali areas on the right side of the river upstream of the barrage. The general layout of the barrage, the areas within the afflux bund, embankments and the line of communication, etc., were annexed to the project.

In the design, there were two canal offtakes, one on the eastern side and the other on the western side. The eastern canal was to be totally within the Indian Territory. This

Box 1: Major River Treaties between Nepal and India

canal is designed to irrigate 612,500 ha of agriculture land in India. Making use of the canal drop, a power house with the capacity of 20,000 KW has been constructed at a distance of 11 km from the Barrage in the Indian Territory. On the western side of the Barrage, the canal passes through 35 km in the Nepalese Territory and enters the Indian Territory. This canal provides irrigation water to 11,300 ha of agriculture land in the Nepalese Territory and 356,610 ha of agriculture land in the Indian Territory. Afflux bunds of about 12 km long and 40 km of embankment have been constructed within the Nepalese territory.

After the agreement was signed there was a huge opposition as the benefits of the project accrued more to India. The provisions of the agreement established the sway of the Indian government in the whole of the Kosi and its tributaries and placed the river virtually under its control. The agreement was subsequently amended in 1966: its ambit was limited to the Kosi Project and other projects were left entirely to new agreements in the future. However, people displaced by the project are yet to be compensated.

GANDAK TREATY: The Gandak Project Agreement was signed in 1959. Under the project, a barrage has been constructed at the Gandak River near Bhaisalotan to regulate the flow of water for irrigation and power purposes. Two canal takeoffs from either side of the barrage have been constructed. The Main Eastern Canal lies in the Indian Territory but one of its branches called the Don Branch Canal reaches the Nepal-India border and bifurcates into two canals. The Nepal Eastern Canal is one of them and passes through Parsa, Bara, and Rautahat districts of Nepal. The main eastern canal provides irrigation water to 920,520 ha in India and 37,200 ha in Nepal. The western canal provides irrigation water to 4,700 ha of land in Nepal and 930,000 ha of land in India. Another canal, called Nepal Western Canal, takes off from the western side of the barrage. The command area of this irrigation canal is 16,000 ha. On the main western canal at Surajpura, in the Nepalese Territory, lies a power house, which utilises the head drop in the canal to generate 15,000 kw of power. This power house has been handed over to Nepal as stipulated in the agreement.

Two important amendments were made in the original Agreement after a strong opposition to the unequal benefit sharing between the two countries. This amendment did away with the schedule of the supply of water in the canal, which limited the rights of Nepal to the waters of the Gandak River. The amended Clause 9 ensured that the Government of Nepal will continue to have the right to withdraw for irrigation or any other purpose from the river or its tributaries in Nepal, such supplies of water as may be required by them from time to time in the Gandak Valley. The second important

Box 1: Major River Treaties between Nepal and India

amendment provided for the handing over of the canals systems, including the service roads, situated in Nepal Territory, except the Main Western Canal, to the Nepal Government for operation and maintenance. These amendments made some improvements. However, the basic tenets of the Agreement could not be changed. The project still remained wholly owned and controlled by India. Whatever little benefits that were given to Nepal seem to have been given on the consideration of the land that was made available by Nepal.

MAHAKALI RIVER TREATY: Nepal and India concluded a treaty concerning the Integrated Development of the Mahakali River, including the Sharada Barrage, Tanakpur Barrage and Pancheshwor Project, on February 12, 1996. The treaty is popularly known as the Mahakali Treaty. The treaty consists of 12 Articles. A letter was also exchanged between the two governments on the same day. The letter so exchanged refers to the treaty, the decisions taken in the joint commission dated December 04-05, 1991 and the joint communiqué issued during the visit of the Indian Prime Minister dated October 21, 1992 and purports to have reached an agreement between the two governments on some of the points concerning the application of the provisions of the treaty and the desires expressed in the above mentioned documents.

In the history of post-1990 Nepal, the Mahakali Treaty has been the most debated issue, which aroused sharp debates in the civil society, divisions among the political parties, and demonstrations on the streets, and even professionals of repute were sharply divided in their opinion on assessing the Treaty. The debate has not subsided as yet. The Treaty purports to prepare a Detail Project Report (DPR) for a mega multipurpose project called Pancheshwor within 6 months of the conclusion of the Treaty. Both the countries are far apart on various issues relating to the DPR. Not only has the DPR not been completed, even the Mahakali Commission, which is supposed to make recommendations to both the parties for the conservation and utilisation of the Mahakali river as envisaged and provided for in the treaty, has not been constituted.

Excerpted from Upadhyay, Surya Nath. In International Watercourses Law and a Perspective on Nepal-India Cooperation. Kathmandu: Ekta Books, 2012

3. Navigation on Nepal's Rivers

Preconditions for Inland Waterways

Rivers vary in characteristics depending on the free discharge of water and sediment. River behaviour depends on the geological character of the valley, the river hydrodynamics, and the associated sedimentation and erosion processes. Thus, not all rivers are navigable. Navigating rivers in Nepal could be bit tricky as two thirds of the country's land is covered by hills and mountains. One of the basic preconditions for navigation is maintaining least available depth (LAD) of a minimum of five feet (International Navigation Association 2003). Moreover, developing inland waterways would require river engineering that will involve periodic dredging to remove silt and sediments from riverbed. At present, Nepal's rivers are left to flow on their course and carry large silt load, making navigation difficult.

Kosi River Basin

The Kosi River originates in the Tibet region, passes through the entire vertical length of Nepal to enter India and ultimately merges into the Ganges River. The Himalayan River is formed by the confluence of seven tributaries — Indrawati, Sun Kosi, Tama Kosi, Dudh Kosi, Likhu, Arun and Tamor. The river is also known as Saptakoshi once it hits the plains in Nepal at Chatara in eastern Nepal. Of the 720 km length of the Kosi, 513 km lies in Nepal (Aryal and Rajkarnikar 2011). Of the estimated drainage area of 60,400 sq. km, 31, 940 sq. km falls in Nepal. The River enters India at Bhimnagar–about 50 km from Chatara–and finally reaches the Ganges River near Kursela.

The River is notorious for carrying large sediment loads which makes it shift its course frequently. The maximum observed annual silt load at Barahkshetra (where three major tributaries converge and become one river) is found to be about 229,860 ac ft. (Upadhyay 2012). The fast-flowing river carries large amounts of silt load as it cuts across landslide-prone Himalaya and Siwalik ranges. As the river fans out upon reaching plains, the high aggradations of river bed and sediment load offer resistance to the water, forcing the river to find alternate paths, resulting in lateral shifts of the river course. The high water discharge during monsoon and shifting courses has been causing large-scale damage of lives and properties in south-eastern Nepal and India's state of Bihar. The river is known as 'the sorrow of Bihar' for the recurrent devastation

caused by the floods (Upadhyay 2012). Thus, hydrology experts recommend channelising the river to confine its lateral movement in order to prevent disasters.

Most recently, in 2008, the Kosi River broke out of its embankment near Paschim Kusaha Village in Sunsari district of Nepal. The ensuing flood affected 70,000 families and displaced 7,000 families in Nepal, while affecting another 3.5 million people in India (UN 2012). More than half a century earlier, in 1954, flood in the Kosi River had displaced about 10 million people affecting 1,200 sq. km. of land. This gave impetus to the Kosi Project, under which the governments of Nepal and India signed an agreement in 1954 to jacket and canalise the river. Even before the agreement was signed, an idea of constructing a high dam in the hills of Nepal to regulate the flow of river was floated by the governments in India. In order to derive maximum gain from the project, the proposal was to use the water for irrigation, hydropower generation and navigation. The idea is to construct a navigational canal alongside the river which would connect Nepali waters to the seaport in Haldia (Upadhyay 2012).

The two governments also conducted a feasibility study on Saptakoshi High Dam project in 1981 and 2001, but a strong opposition to the project in the selected region which would be inundated has not allowed the project to even start drilling for the geological study required to start Detailed Project Report preparation (Oza 2014).

At present, navigation on the Nepali side of the Kosi River is limited to boats used for river crossing at certain places. The boatmen use traditional wooden boats, which is rowed by oars to be kept on course, to ferry passengers from one side of the river to another. There used to be a couple of jet boat services operated from Chatara upstream on the Kosi River's tributary Arun. But it has also stopped after an accident drowned a vessel and other boats fell into disrepair.

Gandak River Basin

The region between Dhaulagiri and Gosainsthan is drained by the Gandaki river system. The river basin has a total area of 34,960 sq. km of which 90 per cent lies in Nepal (Aryal and Rajkarnikar 2011). The river basin is formed of seven major rivers — Trisuli, Kali Gandaki, Seti, Marsyangdi, Budhi Gandaki, Daraundi and Madi (Dixit 1995). The river is known as Narayani from Devghat where Kali Gandaki and Trishuli meet and begins its journey on the Tarai plains. The Narayani River flows for some 55 km before entering India through Triveni in Nawalparasi district.

The Gandak catchments area's geology is weak due to the relatively young age of the hills and mountains through which the river flows. In addition, infrastructure works

— mostly road construction that uses explosives to blast the hills to open tracks — have caused frequent soil erosion and landslides in the upstream region. Thus, the rivers transport the sediments that lay in its course along the high slopes. When the river reaches Tarai the carried materials are deposited in the river and riverbanks leading to a rise in the river bed. However, in the plains the river gradient is gentle. For a one km channel distance, the channel depth is one metre on an average, making the flow of the river gentle which increases its susceptibility to sedimentation (Upadhyay, The Gandak Project Agreement 2012). The accelerated flow of the rivers in the hilly and mountainous terrain has made the tributaries of the Narayani River suitable for hydropower generation projects.

The history of the use of the Gandak waters in India dates back to the British Raj, when Tribeni canal in the province of Bihar was constructed. The need for water for irrigation to the Uttar Pradesh state in India also led the Government of India to mull over the possibilities of having to divert some water to the western side of the Gandak River by constructing a diversion structure upstream. On the one hand, there was an acute need for irrigation, while on the other the river was a major source of trouble. Its flood every year devastated vast areas in India and some in Nepal too. It was in 1947 that the possibilities for using the river water by constructing a barrage upstream and thereby diverting water to the eastern side of Bihar and western side in Uttar Pradesh in India were explored. A report was prepared in 1951 (Uprety 1993). Based on these developments, Gandak Treaty was signed between the governments of Nepal and India in 1959. As a result, Gandak Barrage at Triveni was constructed. However, the matter of developing a navigation network on the river hardly got explored.

Box 2: Waterways Development in India

India has seen renewed interest in reinvigorating its waterways as a viable mode of transport. To develop this potential, India passed a National Waterways Act in April 2016 and recognised 106 rivers as the national waterways with an ambitious goal of shifting India's cargo movement to waterways (Express News Service 2016). Nepal could take this as an opportunity to get connected to the Indian waterways through its own rivers for an alternative mode of international transport movement. Among the eight waters identified by the Inland Waterways Authority of India (IWAI) for development in Phase I are Gandak (NW-37), Kosi (NW-58) and Ghaghra (NW-40), which are the Himalayan rivers known in Nepal as Saptagandaki or Narayani, Kosi and Karnali, respectively (Arora 2017).

In addition, India has already started construction of a multi-modal terminal at Haldia, which is one of the three gateways ports for the inbound and outbound cargo of Nepal (Dutta 2016). The Haldia port is being developed to connect major cities en route including Kolkata, Bhagalpur, Patna, Varanasi and Allahabad on the NW 1. Although connecting Nepal's rivers with Indian waterways would require negotiations on trade and transit between the two governments, Nepal can potentially accrue benefits in terms of cargo transport.

Navigation in Nepal

The nearest seaport from Nepal is about 700 km away from its border with India, and is currently accessed by road and railways. Connecting Nepal's inland waterways to the national waterways in India can offer an alternative, quicker access to the sea, although the transit-providing country would still be India. During the nineteenth century, under British rule, rivers were used to transport goods in India, from Kolkata to Agra and from Kolkata to Assam. The tributaries of the Ganges where powered crafts were difficult to operate were served by country boats which ran up to Nepal's border (Mishra and Hussain 2012).

The first survey regarding the feasibility of developing inland water transport in Nepal was conducted in 1966 by a team of foreign and domestic experts while India was constructing Farraka Barrage (Karki 1995). The study found that depths of Nepali rivers were too shallow and draft too low to be navigable all year round.

However, the said study recommended the Narayani River as the most suitable one to be developed as a waterway. That is the reason for introducing a provision in the Gandak Treaty for having a navigational lock at the Gandak Barrage to ease the

movement of ships. At that time, when the Gandak Agreement was being negotiated, India was constructing Farraka Barrage to use Ganges for inland navigation. Thus, there was interest in assessing other possible navigational connections. The physical structure does have a siphon to allow movement of vessels bypassing the barrage. But, as India lost its enthusiasm for developing inland waterways, the activities in Nepal also did not take off (Karki 1995).

Consequently, works to establish river ports along Ganges River in India were also discontinued which led to cooling down of interest in Nepal. Tribeni in Nawalparasi district in Nepal was a thriving river port where commodities from India were transported via Narayani River. Moreover, following the construction of the barrage, the river in the Nepali side fanned out making navigation difficult. (Upadhyay, The Gandak Project Agreement 2012).

At the same time, construction of the East-West Highway in Nepal diverted the river traffic to the road. As a part of the barrage, there is a river siphon constructed to allow vessels on the river to move between India and Nepal but it is now not functional.

In the 1960s and 1970s, Nepal's *Panchayati* rulers were keen on developing Nepalese rivers as a feasible option of transport (Khanal 2014). That is when the government enacted Ships Registration Act 1971 which provides legal groundwork for owning ships by Nepal and/or by Nepali citizens (Khanal 2014). However, the Act was passive for four decades until Nepal River Transport Company and Sumnima Jal Yatayat Company were issued licences to own jet boats that operated in the Arun River arm of the Saptakoshi River (CriOnline 2009).

The Kosi River has also seen quite a few attempts at developing a viable water transport system. In 1980, an inland waterways development project was established in the Ministry of Works and Transport (Karki 1995). The department conducted reconnaissance studies in three major rivers of Nepal. However, it failed to make any major breakthrough in developing inland navigation. Moreover, test operations of jet boats were conducted in the Kosi River from Chatara towards Tumlingtar, and also in rivers such as Bheri and Trishuli and in some selected locations in the downstream area of the Kali Gandaki River. However, the test run showed difficulties in navigation in the rivers as the high silt content frequently broke down the jet engines (Karki 1995).

Kali Gandaki-one of the tributaries of Sapta Gandaki-at higher altitude near Beni, Myagdi
PC: SAWTEE

The possibility of developing waterways has been mentioned oftentimes in policy documents, government plans (WECS 2002), and regional discourse (SAARC Secretariat 2006). However, no serious effort seems to have been dedicated towards making this a realistic option. The Ministry of Physical Infrastructure and Transport (MoPIT)'s Transport Division looks after the issues related to inland water transportation. But, during a verbal communication, it was found that after 2012 no work has been done on this issue due to budget constraints and a lack of experts. Moreover, there is no substantial work done to explore the possibility of cross-border river connectivity.

At present, the rivers in Gandak tributaries do not boast of any inland waterways. There is no mechanised navigation service available in rivers, except for a steamer service on the reservoir created by the construction of a dam for Kali Gandaki A Hydroelectric Project in Syangja (Gautam 2016). The steamer service running between Mirme and Set Beni in Syangja has not only made movement easy but has helped bring the prices of commodities down due to inexpensive transportation. In addition, the steamer is also a popular tourist attraction in the area popular as a pilgrimage site. Besides that, the only navigation in those rivers is either white water rafting for recreational purpose or country boats that ferry passengers for river crossing. Similar is the case of Kosi River Basin.

At the policy level, there is a tacit understanding that Nepali rivers in the current state are not navigable and would require substantial investments in the construction of storage dams and river training facility, for which adequate budget has not been allocated.

In the recent times, the MoPIT commissioned a feasibility study for water transport in the Kosi, Gandaki and Bheri River basins in 2012 (Ecocode Nepal and East Consult 2013). The study done by engineering consultants EcoCode Nepal and East Consult appraised the 175 km, 150 km and 125 km of the Kosi, Gandaki and Bheri Rivers, respectively. The study has concluded that the most of the routes they appraised were suitable for operating vessels for recreational and touristic purposes.

Box 3: Saptakoshi High Dam Project

The Saptakoshi High Dam Project was envisaged as part of the Kosi Project as a measure for flood control and river channelling. Storage dam to control flood was envisaged during the time of British rule in India (Thapa 2009).

The Government of India, Central Water Commission, as far back as 1981, prepared a feasibility report on the Kosi High Dam Project and tentatively fixed its parameters. For Nepal, the project also envisions constructing a navigational canal on the Saptakoshi River as one of the components (Upadhyay, Agreement on the Kosi Project 2012). The total length of Kosi Navigational Canal would be 165km, out of which a 120 km long section would be in Indian territory. India and Nepal agreed to begin the works to prepare a detailed project report at the location of the dam site — Barahkshetra in Sunsari, where three tributaries of the Kosi converge. The joint project office was set up in 2004 in Biratnagar. Owing to strong opposition from the locals of the areas up in the hills and mountains that are expected to be inundated, the work has not progressed. The dam is likely to affect hundreds of thousands of people in least at 82 villages located 500 feet above sea level (Sharesansar 2012).

The river flow pattern makes navigation on motored boats difficult. The water flow speed in the still sections may vary from 0.5 to 1.0 m per second. But such stretches are limited due to the steep river bed gradient and debris. The study found in the sections of river where higher speed rapids prevail, jet boats services could be suitable. However, the cost of vessel and operation would be expensive making the operations unfeasible. The varying river depths throughout the year meant the service could not be operable all year long. The report concludes that commercial water transport for mass passengers and goods movements is not recommended at the present condition; however, recreational water transport could be prominent in the studied sites.

Table 2: Waterways route specifications

Section	River	Length (km)	Average Depth (m)	Average Velocity (m/s)	Average Gradient
Kosi: Barrage –Chatara	Saptakoshi	47.05	3.87	1.2	1in 1681
Kosi: Chatara -Simle	Saptakoshi	8.72	8.64	1.4	1in 872
Kosi-Tribeni-Simle	Sunkoshi	48.47	9.7	1.7	1in 591
Kosi: Saune-Ghurmi	Sunkoshi	69.12	16.9	2.1	1in 452
Kosi: Dolalghat-Chatara	Kali Gandaki	130.425	16.2	1.5	1in 662
Gandak: Devghat-Ramdi	Trishuli	32.638	6.75	1.4	1in 859
Gandak: Devghat to Aptra	Trishuli	16.6	5.47	2.2	1in 426
Gandak: Devghat-Mugling	Kali Gandaki	4.5	Existing service		
Gandak: Mugling-Fisling	Bheri	15.59	6.6	1.4	1in 708
G: Mirme-Setibeni	Bheri	36.99	3.74	2.3	1in 355
Bheri: Chisapani-Ghatgaun	Bheri	19.804	4.04	2.2	1in 440
Bheri: Ghatgaun-Taranga	Karnali	50.51	3.18	2.1	1in 446
Source: Feasibility Study of Water Transport along Kosi, Gandaki and Bheri River Basins/ Draft Report 2013					

Table 3: Cost benefit analysis of water transport

Section	Service	NPV	IRR	B/C	Remarks
Kosi: Barrage – Chatara	Proposed waterway for Recreational	668.62	172%	33.67	Feasible
Kosi: Chatara - Simle	Existing waterway	-472.43	900%	-38.32	Feasible to high willingness to pay
Kosi-Tribeni-Simle	Proposed waterway for Public Transportation	157.4	86.38%	10.69	Feasible
Kosi: Saune-Ghurmi	Technically not Feasible				
Kosi: Dolalghat-Chatara	Existing Rafting Route	41.06	36%	3.53	Feasible for Tourism
Gandak: Devghat-Ramdi	Existing Rafting Route	15.33	19.68%	1.75	Feasible for Tourism
Gandak: Devghat to Aptra	Proposed waterway for public Transportation	15.33	19.68%	1.75	Feasible
Gandak: Devghat-Mugling	Proposed waterway for Recreational	38.12	24.28%	2.31	Feasible
Gandak: Mugling-Fisling	Existing Rafting Route	14.82	19.70%	1.72	Feasible for Tourism
G: Mirme-Setibeni	Existing Rafting Route	18.06	21.30%	1.68	Feasible
Bheri: Chisapani-Ghatgaun	Proposed waterway for Recreational	91.27	49.56%	5.44	Feasible
Bheri: Ghatgaun-Taranga	Proposed waterway for public Transportation	4.43	14.05%	1.22	Feasible
Bheri: Taranga-Kamalpur	Proposed waterway for public Transportation	3.73	14.10%	1.18	Feasible
Bheri: Kamalpur-Bbotechaur	Not Feasible due to no willingness to pay				

Source: Feasibility Study of Water Transport along Kosi, Gandaki and Bheri River Basins/ Draft Report 2013

Based on the report, the MoPIT shelved the plan for going ahead to develop water transportation, as the government did not earmark sufficient funds for this purpose. The government had set aside total NPR 15 million to carry out the feasibility study for water transport in the fiscal years 2011-12 and 2012-13 (ShareSansar 2013).

4. Water Transport and its Impacts

Intersection of Water Transport and Livelihood

The number of people directly linked with water transport for livelihood in Nepal is low. Nevertheless, the lives of quite a few people such as boatmen, fishermen and inhabitants of villages near river banks are affected by waterways. For instance, the lives of the people of Tribeni that live by the Narayani River are interlinked with rivers and boats that ply the river. Likewise, for fishermen in Laukahi by the Kosi River and a few thousand people who live in the so-called Srilanka Tappu by the river are dependent on it and the makeshift water transport for their livelihoods. Findings of this section are based on interaction with the locals and key informants during a field survey in January 2017. This chapter looks into how the river transport system interlaces with daily lives and livelihoods of the people in selected locales.

The Kosi River Basin

The areas adjoining the Kosi River are heavily dependent on agriculture. The Kosi floodplains are one of the most fertile lands in Nepal. The alluvial soil and relatively abundant irrigation facility has made Sunsari one of the best performing districts in Nepal in terms of agriculture production. Despite the possibility of different uses, water of the Kosi River has been left to waste besides a fraction of it being utilised for irrigation.

Navigation in the river is almost non-existent, except for a few wooden boats that are used as an alternate to bridges. The boats are used by people in villages that are across the river. These villages that fall under Mahendranagar and Prakashpur VDCs are dependent on the relatively urban townships at Chakatghatti or Laukahi for livelihood. These people have no other option but to cross the river on a makeshift wooden boat operated on skills and strength of rowers seated at the two edges of the river. These boats are the sole medium of transportation that connects the people of 'Srilanka Tappu' with other places. Kosi's changing course and subsequent floods have divided the river, creating a peninsula which is known as Srilanka Tappu.

People crossing Koshi on wooden boat from Udaypur to Sunsari at Sisauli Ghat, Sunsari
PC: SAWTEE

Srilanka Tappu is not exactly an island; it is joined with Udaypur district and the Sunsari side is relatively urban and linked to better facilities. The area covering two wards of Prakashpur VDC and one ward of Mahendranagar VDC (both VDCs are now under Barah Town Council) is home to about 15,000 people. They are completely dependent on boats to travel to and from the market. The boat-crossing services are operated at two points at about five kms distance, all year long. Due to their dependency on boats for river crossing, a village on the other side of the river, known as Jalal Tappu, has built a boat and have rented it out to boat operators for NPR 8,500 per year. The locals of the village are not charged by boat operators.

The VDC Offices auction the rights to operate boats in the river every year. This time the highest bid amount was NPR 501,000 for Prakashpur VDC and the right to operate boats from Mahendrangar was auctioned for NPR 1.1 million. The bid amount reflects the possibility of income from operating boats for the crossing. According to the VDC official and boat operators, last year the bid amount was NPR 2.3 million for the Mahendranagar river crossing operating from Sisauli Ghat. However, the number of passengers was expected to come down this year following the opening of the bridge at Chatara. Despite the VDC earning revenues from selling the rights to navigate, it neither does any monitoring nor sets rules and standards for the boat operators. The boats can fit 20 people comfortably but during rush hours more than 40 people are carried in a single vessel. Each passenger is charged NPR 50 for a two-way trip. And motorcycles are charged NPR 100.

Ghat at Prakashpur, Sunsari on Koshi River
PC: SAWTEE

The primary beneficiary of the boat is the inhabitants of Srilanka Tappu, which has a population of about 2,000. Though there is a primary school and a government-run health post, for everything else the people there have to cross the river and go to the nearby towns of Chatara, Rajabas, Inaruwa or Itahari. Many of the older children go to school in Rajabas and men from villages cross the river to go to work as daily wage labourers. Likewise, the agriculture produce grown in the area is also transported for sale via those wooden boats. Without those boats they would have been compelled to live isolated lives without any option for higher education, better health and improved income generation. The boats are like a bridge for the people, linking them with better opportunities.

However, crossing a volatile river such as Saptakoshi is not without risk. In September 2016, a boat carrying 42 people capsized at Prakashpur that left five people missing. The incident has dissuaded the people of the area from using boats unless absolutely necessary and has seen the passenger traffic dwindling. And, some of the villagers, especially women who do not know how to swim, say that they wish for a bridge to be built there so they do not have to rely on boats.

At present, there is no motorised vessel running on the Kosi River. However, till a few years ago there were two companies operating jet boats on the river upstream towards Bhojpur and Dhankuta. Till 2012, jet boats operated by Sumnima Jal Yatayat Company and Nepal Water Transport Company were operated on the Arun River portion of Saptakoshi from Chatara to Simle bordering Bhojpur and Dhankuta

districts. A boat, with a carrying capacity of 25 persons, travelled 15 km in 15 minutes and each passenger was charged NPR 250 for a trip. The service had highly benefitted the people living in the hilly areas. The service had provided an alternative route of travel to the people in the hilly region of Dhankuta and Bhojpur. On road, travelling the same distance took about 10 hours.

Sumnima's jet boat drowned in the river in September 2011 and the company was forced to discontinue its service. Nepal Water Transport also discontinued its service from April 2012 after both its boats broke down as the fans of the boats were damaged by silt in the river and spare parts were not available for repair. People around Chatara remember the queues that lined up to travel on the river when the boats were in operation. Not only people from hills but also tourists from Biratnagar, Itahari and Dharan flocked to the town for a boat ride.

A new group of investors planned to reintroduce a similar service from April 2017. They have already ordered a jet boat but they are yet to apply for permit and license although they have already registered a company for the purpose. Earlier, the companies that were operating the service on the river were granted permit under the Ship Registration Act 1971. Besides registration fees, permits and corporate taxes the companies are required to pay on their profits, the water transport service provider at the Kosi River did not pay any formal fees.

Although the lack of river navigation has made people highly dependent on the unreliable road transport, fishermen in the river take it as a positive thing. They fear that motorised vessels would scare off the fish and affect their livelihood. At present, in the area there are about 200 fishing households that are dependent on fishing for their livelihood. Fishermen already are in a precarious situation as a 17 km stretch of the river falls in the Kosi Tappu Wildlife Reserve. The Reserve, which is home to protected wild animals, issues permits to the fishermen who can venture into the river on their small canoe-like tin-boats for fishing. The fishermen from the area near Laukahi venture as far as Bhimnagar where the Kosi Barrage is located but do not cross the border. There are small boats rowed by fishermen on the Nepali side of the barrage that ferry passengers mostly for touristic purpose.

As of now, commercial navigation is non-existent in the Kosi River. But people in the area are aware that commercial navigation could be possible in the river after the construction of the proposed Saptakoshi High Dam (See Box 3). But, owning to the possibility of large-scale inundation, there is strong opposition to the project from the locals hailing from plains in Itahari to the mountainous areas of Sankhuwasabha. At the same time, people in Sunsari seem to be open about starting trans-boundary water

connectivity, which they see as an opportunity for better job creation and could change the economic face of the region for good.

The Gandak River Basin

The Gandak Basin also does not have a proper inland waterway route. Prospects of developing navigable waterways are ample once rivers – Trishuli and Kali Gandaki – converge into the Narayani River near Devghat, and flow on a flatter surface. The river could have emerged as an alternate route to travel from Narayanghat to Triveni, bordering India. However, such undertaking is not possible due to the Chitwan National Park. The National Park does not allow automated steamers or other types of boats citing adverse impact on the habitation of animals in and around the river. Thus, the topic has become a bone of contention between authorities at the Ministry of Forest and Soil Conservation and the Ministry of Local Development.

At present, navigation on Narayani is limited to ferrying pilgrims and tourists from Tribenighat to the banks of Balmiki Dham. However, that in itself is a thriving economy. Especially, during the festive seasons that see carnivals being organised in winters for Maghi and Maghe Aunshi (both occasions fall between mid-January to early February), the locals of Tribeni see a boost in income. The VDC even hires boats from the boatmen to ensure smooth service during the time. The income from tickets sales to passengers are then shared equally between the VDC and boatmen. Along with the country boats, the VDC also hires motorised steamers from India to ferry the passengers during that time. The vessels are brought to Tribeni via road on trucks as there is no way for those vessels to pass through barrage. Despite the existence of the siphon to allow vessels to cross the river, it is not functional. The cost of bringing in the vessels on trucks itself makes boating expensive during festivals.

Fanning out of Narayani River on the Nepali side at Gandak Barrage
PC: SAWTEE

Boatmen in the area point out that their inability to expand their fleet with motorised boats mean their income has remained stagnant over time. The reliance of boatmen on smaller wooden boats also means their course is limited as much as the boat's movement is dictated by the currents and speed of the river. At the same time, they have also expressed apprehension about allowing larger vessels to ply the river, lest they be displaced. They say that if such a decision is taken, they should be provided with training and other capacity-building activities to operate such vessels.

Box 4: Promoting Tourism through Navigation

The locals of Prakashpur, Chatara in Sunsari district and Tribeni in Nawalaparasi where field study was undertaken were of the view that water transport could make areas a viable tourist destination. A thriving tourist industry would not only develop regions but also create job opportunities for locals. In the Kosi River, the jet boat service had contributed to attracting tourists from far and wide, including bordering towns of India. Similarly, one of the major sources of income for the locals at Tribeni is the income from ferrying passengers on the wooden boats from one bank to another.

Thus, they are optimistic that the expansion of any form of water transport, be it only short-haul ones, will be effective in enhancing local livelihoods. Such services will create synergy among boatmen, homestay operators and local businesses, which will result in the development of the region. Moreover, they pointed out that existing wildlife reserves in the vicinity — Kosi Tappu Wildlife Reserve in the Kosi Basin and Chitwan National Park in the Narayani River Basin — allow them to attract tourists already visiting those sites. If the added attraction of river safari could encourage the tourists to lengthen their stay even for a day, it would help promote tourism in the regions, according to the locals.

The presence of the wildlife reserves on the path of the river also necessitates maintaining a balance between river traffic and a fragile ecosystem of the river and surrounding areas. This problem is mostly evident in Narayani River Basin. People from Tribeni say that they different requirements such as conducting Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE) in order to expand their services within the jurisdiction of the Chitwan National Park are beyond the locals' limited capacity.

Navigation and Environmental Concerns

Navigation on rivers is limited to country boats used for short distances of less than a km on an average. No modification to the natural course of rivers and an absence of motored diesel-guzzling vessels on the rivers mean the direct environmental impact of

navigation is limited. Both the river basins that the study focuses on flow through protected forest reserves, so due consideration is provided to environmental aspects.

As in the case of the Narayani River, concerns regarding habitation of aquatic reptiles, such as ghariyals have prevented navigation on larger motorised vehicles. The river safari operated under the ambit of the national park also uses wooden row boats for minimal impact on the habitation of the animals. At the same time, in the Kosi River, the Kosi Tappu Wildlife Reserve actively monitors the fishing taking place in the river. About 200 households involved in fishing in the lower stretch of the Kosi River are reliant on the Kosi Tappu Wildlife Reserve security force and administration to address their concern. On the other hand, they also do not venture into restricted areas.

The Kosi Tappu Wildlife Reserve and its buffer zone are not spread to Chatara where private companies operated jet boat services and soon a new one is planning to restart the service. However, ports from where boats load and unload passengers are in a protected community reed forest under the care of two different groups. According to the presidents of groups, the boating service providers do not contribute to the conservation of the area. As a similar jet service is mooted to begin operation in the same route, this time they are planning to issue a permit to use their lands only after getting a signed commitment on conservation.

On the other hand, earlier when the jet boats were being operated, operators had placed a request at Ministry of Physical Infrastructure and Transport to remove boulders that obstructed their route. The Ministry said that it would have obliged but the location of the boulders was as such that no existing equipment could reach the place. Such a haphazard action without proper impact assessment, if it takes place on a larger scale, could be detrimental to rivers' course and flow. Thus, navigational development also needs to carefully tread in such a manner that ecological and environmental balance is maintained.

Gender and Inland Navigation

Current water transport service or the lack thereof does have different impacts on men and women in the field locations. Most prominently, inadequate river transport service has restricted mobility of women. This can be observed especially at the villages bifurcated by the Kosi River in Sunsari. Women from Jalal Tappu village said that their mobility is limited as they are dependent on a single boat for river crossing. As most of the economic activities are happening on the other side of the river, the women in the village do not have employment opportunities except for farming. The women in

the village are losing out on wages they could have earned by working in the land across the river. At the same time, villages on the Prakashpur side are also losing farm hands. In addition, to sell their agriculture produce on the local *haat* women also need to cross the river. Sometimes, they tend to carry less quantity than the can due to an increased number of passengers on that particular day.

River ghat at Koshi at Sisauli Ghat, Sunsari
PC: SAWTEE

Moreover, as most of the amenities, such as high school and healthcare facilities are on the other side of the river, a lack of reliable water transport constricts their access to those amenities as well. Notably, medical emergencies during the night time are impossible to attend to on time. Thus women during the last months of their pregnancies tend to avoid living in the village. As these women are not much good in swimming they are more worried about erratic currents while crossing the river. That is the reason why they wish the government would install a bridge to aid the river crossing, so that they would not need to resort to such a risky option.

In the Gandak basin area, a lack of proper navigation, despite not affecting women's mobility, restricts them from generating income. The women in the area generate considerable income by setting up businesses during the festive seasons when the area organises carnivals (between mid-January and mid-February). Except during carnivals, there are no such opportunities available for women. They say if only more vessels are allowed to be used in the river and Tribeni dham is promoted as a tourist destination among domestic tourists, the place could get a facelift. Due to the lack of economic activities in their area and because, unlike men, they cannot travel to places a little far

away seeking jobs and business opportunities, women have limited prospect of income generation.

Trade and Inland Waterways

Getting a direct access to the sea for cargo movement for Nepal would translate into lower trade costs. Due to its geographical disadvantage and overdependence on India's congested Calcutta and Haldia as gateway transit ports, Nepal suffers from high trade costs. Importing a consignment in Nepal takes about 39 days, while exporting takes 40 days (World Bank 2016). Likewise, Nepal spends 75 per cent of the total cost of transhipment on the cost related to transit (De 2015). Reducing the cost of trading is an imperative for Nepal to make its trade cheaper and faster. Commercial navigation could allow consignments to be transported from border ports on a vessel without the hassle of numerous loading and unloading, thus reducing the duration and cost of transit.

As IWT in South Asia is receiving growing attention from the governments and international agencies alike, inland navigation could emerge as a viable option for countries like Nepal and Bhutan. Navigation has been taken up as an important part of the integrated river management programmes. Moreover, the Indian government is working on developing its rivers as viable waterways for commercial navigation. India's newly enacted National Waterways Act which recognised 106 additional waterways along with the five already existing waterways is a first step towards developing waterways for commercial purposes (Sood 2016). The new additions include rivers such as Kosi, Gandak and Ghaghra which flow to India from Nepal and are known in Nepal as Kosi, Gandaki or Narayani and Karnali, respectively. Similarly, through the Ganges River, Nepal could not only get access to the Haldia port in India, but can navigate through Bangladesh to the ports in Chittagong and Mongla.

Although developing waterways is not a policy priority in Nepal at present, the increased all-round interest in multi-modal sub-regional connectivity could inspire Nepal to devote more resources to developing inland waterways.

Conclusion

The Himalayan rivers can emerge as an alternative route of transport connectivity in eastern region of South Asia. In the region, not only are the two Himalayan countries —Bhutan and Nepal—landlocked but also a significant part of India in the North is far from the sea. However, the region is traversed by perennial Himalayan rivers which provide possible supplementary passage for access to the sea. Inland navigation was a prominent mode of cargo transport in the Northeast of India until seven decades ago. The independence and subsequent partition of British India strangled the inland water transport as a large course of the inland waterways fell in a new country. Unlike India and Bangladesh, Nepal hardly had any navigable river networks. Most of the navigation was limited to wooden boats for river crossing. Recognising the potential of inland navigation as a gateway to better transport and trade infrastructure, Nepal's has been envisioning development of waterways. However, as water resource issues were always dominated by energy development, river navigation is still waiting for a concrete and result-oriented large-scale outcome to determine the future course of direction.

Navigation as an alternative and cost-effective mode of transport could be a crucial tool to help Nepal facilitate its trade. Nepal ranks at 124 among 160 countries in the World Bank's Logistics Performance Index (LPI) (World Bank 2016). For landlocked countries, in many instances, transport costs represent a more restrictive limitation on participation in international trade than tariffs or other trade barriers. What land countries pay for transport services is, on average, almost three times more than tariffs (Chowdhury and Erdenebileg 2006). Thus, inland navigation, which is considered the least costly option, is deemed to be suitable for bulk cargo transport that does not require urgent delivery —notably fuel.

Nepal's artery to international trade has always been India and India is pursuing inland waterways development with large investment in improving its existing infrastructure. As India is investing heavily in the development of its own inland waterways, Nepal could benefit immensely if it could develop viable waterways on the rivers on the southern plains for better connectivity. All of the Himalayan rivers that reach India through Nepal have been declared waterways by the new Waterways Act of India.

Developing waterways will not only facilitate trade and, in turn, make Nepali exports competitive and imports less expensive, it will also create an economic ecosystem of its

own. As the examples of the Mekong River and the South American rivers such as Paraguay and Parana illustrate, river ports give rise to vibrant cities and economic hubs. Such development could enable a much-needed job creation along the waterfronts, uplifting livelihoods.

Despite the perceived benefits of connecting rivers, Nepal has failed to translate the idea into a reality. Inadequate studies on feasibility of water transport and, worse, weak institutional memory at the government agencies have also created gaps in knowledge management regarding past studies. Unlike hydropower development, prospects of commercial navigation in Nepali rivers have not been explored enough. In the recent decades, only one such study has been undertaken and in the 1990s another study was commissioned by the Ministry of Physical Planning and Works but the report could not be found anywhere. The library catalogue at Water and Energy Commission Secretariat (WECS) shows the report is in existence but it could not be located.

Thus, the most important task for developing inland waterways is for the government to undertake a comprehensive feasibility study of the rivers. Without having a concrete data on costs and benefits on hand, navigation would remain a pipe dream. The feasibility study should also include social and environmental impact assessment, along with a distributional analysis. As developing navigable waterways will require substantial investment in embankments, canals, dredging, constructing and maintaining ports, without a guaranteed return and financial viability no investor will agree to invest. For that reason also, study is the most critical element at this stage.

Likewise, navigation should be a part of integrated water resource management framework that has come into prominence of late. Right to generate hydroelectricity from most of the rivers in Nepal has already been issued. This will create a problem in the future as the power developers might construct a dam affecting flows of the rivers. In such a scenario, commercial navigation cannot be imagined to sustain. There should be an integrated plan in place that would ensure multiple and equitable use of water for different purposes such as irrigation, energy generation navigation and so on.

During the course of the research, many experts echoed that inland navigation could definitely open up new economic possibilities for Nepal. However, they also expressed their scepticism on the viability of river navigation due to river gradient and flow of the Himalayan rivers as Nepal is a country of mountains, not rivers. A detailed feasibility study on each river could contribute to the assessment of financial and economic viability of navigation. Moreover, it would provide a much-needed functional clarity on the steps to be taken for river engineering in order to make the

rivers navigable and what would be its costs and benefits. Only a multidimensional distribution and impact assessment on livelihood, ecology, gender and indigenous lives could lead to informed decision making on the part of policy-makers. In the absence of such studies creating inland navigation infrastructure would remain a pipe dream fraught with mistrust and conspiracy theories as in the case of Saptakoshi High Dam.

Mostly, experts and policymakers in Kathmandu acknowledged that the Saptakoshi High Dam and subsequent Kosi Navigational Canal could be the best way to approach inland navigation, provided the issues related to opposition from the locals are resolved. They tend to ignore the need to improve existing smaller waterways that could be practical. For example, the operators of Chatara jet boat service say that there was almost no support provided to them despite the then PM inaugurating the service. Similarly, the 2012 feasibility study also showed slight viability of operating jet boats on some of the courses but no step was taken. The private sector seems to be either indifferent or ignorant about the possible opportunities offered by the rivers. The lack of interest in navigation means that there is no guideline or regulation to regulate the existing service providers on the river, though the VDCs charge a fee for issuing permits.

At the same time, lack of any institutional and legal framework could also be an advantage for Nepal. As there is absolutely minimal structure at present, Nepal can begin from scratch and mould the policies that could be compatible with the new political structure of federal states as well as incorporate the best possible model for inclusive policy to benefit the traditionally disadvantaged groups such as *aadivasis, janajatis, dalits* and women.

Recommendations

Against this backdrop, there is a critical need for Nepal to develop an integrated water transport system so that maximum benefits could be accrued causing minimal societal and environmental damages. It would involve setting up institutional mechanisms, commissioning studies to investigate viability of rivers for navigation, preparing policies and plans, strengthening water transport facilities in existence, among others.

- Undertake a comprehensive feasibility study of rivers to assess navigability;
- Identify complementary infrastructure such as connecting roads to facilitate multi-modal transport services;
- Identify sites for possibility of upgrading existing traditional boats, keeping in mind its social and ecological impact; and
- Prepare a set of guidelines to monitor and regulate existing services for safety of the passengers.

- On the institutional front, Nepal needs to set up a body or an entity assigned with the task of developing waterways
- A comprehensive set of policies, Act and regulations needs to be framed to facilitate navigation in coordination with other water usage
- Incentives to increase private sector participation – for example, clarify the provisions related to taxation and subsidies, if any
- To establish transboundary inland waterways connectivity to facilitate trade, Nepal needs to hold talks with neighbouring countries, especially with India
- Integrated basin navigation management approach needs to be adopted

Annexure

Information related to Key Informant Interviews and Focused Group Discussion

Location	Key Informant (name, designation, organisation)
Kathmandu	Madhav Belbase, Joint Secretary, Water and Energy Commission Secretariat
Kathmandu	Keshab Dhoj Adhikari, Joint Secretary, Water and Energy Commission Secretariat
Kathmandu	Dilli Raj Ghimire, Joint Secretary, Ministry of Law
Kathmandu	Ranjan Krishna Aryal, Secretary, GoN (Nepal Law Commission and Ministry of Tourism)
Kathmandu	Rabindra Adhikari, Member of Legislature-Parliament, CPN (UML)
Kathmandu	Jeebachh Mandal, Project Chief, Nepal-India Joint Project Office Saptakoshi Sunkoshi Investigation
Kathmandu	Niraj Sharma, Senior Divisional Engineer, Ministry of Physical Infrastructure and Transport
Kathmandu	Bikas Thapa, Chief Reporter, Annapurna Post
Kathmandu	Shahriar Wahid, ICIMOD
Kathmandu	Ananda Bahadur Thapa, Academic/Expert
Kathmandu	Nischal Nath Pandey, Director, Centre for South Asian Studies
Triveni	Gopal Chandra Dhakal, Coordinator, Gandak Sangharsha Samiti
Trivenisusta VDC	Bel Prasad Bhandari, Secretary, Triveni-Susta VDC
Nawalparasi	Rajesh Sahani, Chairperson, Balmiki (Jalchar) Consumers Forum
Biratnagar, Morang	Dr Bhesh Prasad Dhamala, Ex Registrar of Purbanchal University
Jhumka, Sunsari	Ram Prasad Mehta, Vice President, International Network on Participatory Irrigation Management (INPIM)-Nepal
Tarahara, Sunsari	Dipendra Raj Karki, Chairperson, Abhiyan Nepal

Location	Key Informant (name, designation, organisation)
Chakarghatti, Sunsari	Rabin Ghimire, Chairperson, Union for Culture, Human and Environment Protection (UCHEP)-Nepal
Kathmandu	Purushottam Ojha, Trade Expert, former secretary of Commerce Ministry, Government of Nepal
Kathmandu	Ajaya Dixit, Executive Director, Institute of Social and Environmental Transition (ISET)-Nepal
Kathmandu	Keshab Poudel, Editor, New Spotlight Magazine
Chatara, Sunsari	Santosh Bhandari, Chairperson, Jay Barahi Jal Yatayat tatha Paryatan Sewa Pvt Ltd
Kathmandu	Hari Dahal Biyogi, Chairman, Sumnima Jal Yatayat Pvt Ltd Company

Focus Group Discussion: Kosi River Basin		
Location	**No. of participants**	**Stakeholders categories**
Jhumka, Sunsari	10	Local level stakeholders mostly composed of irrigation and forest management group
Sisauli Ghat, Prakashpur VDC, Sunsari	9	People from village called Jalal Tappu
Laukahi/Lauki Bazaar	4	Fisherman

Focus Group Discussion: Gandak River Basin		
Location	**No. of participants**	**Stakeholders categories**
Gandak Barrage in Nawalparasi	6	Community-based groups including government official
Trivenidham, Triveni-Susta VDC Nawalparasi	5	Women impacted by existing water transport service

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Expanding Tradable Benefits of Trans-boundary Water: Promoting Navigational Usage of Inland Waterways in Ganga and Brahmaputra Basins

The Himalayan rivers of the Ganga and the Brahmaputra have created extensive systems of inland waterways in the region consisting of Bangladesh, Bhutan, India and Nepal – BBIN region. The current political discourse on trans-boundary cooperation among these countries has set the stage for institutional analysis of policies, laws and regulations governing inland waterways in the BBIN countries. This study aims to contribute to improving institutions (i.e. policies, laws, and regulations) for inland waterways governance with particular emphasis on transport connectivity and livelihood in the BBIN region. More details about the project can be accessed here: http://www.cuts-citee.org/IW/index.htm

CUTS International

Established in 1983, CUTS International (Consumer Unity & Trust Society) is a non-governmental organisation, engaged in consumer sovereignty in the framework of social justice and economic equality and environmental balance, within and across borders. More information about the organisation and its centres can be accessed here: http://www.cuts-international.org.

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