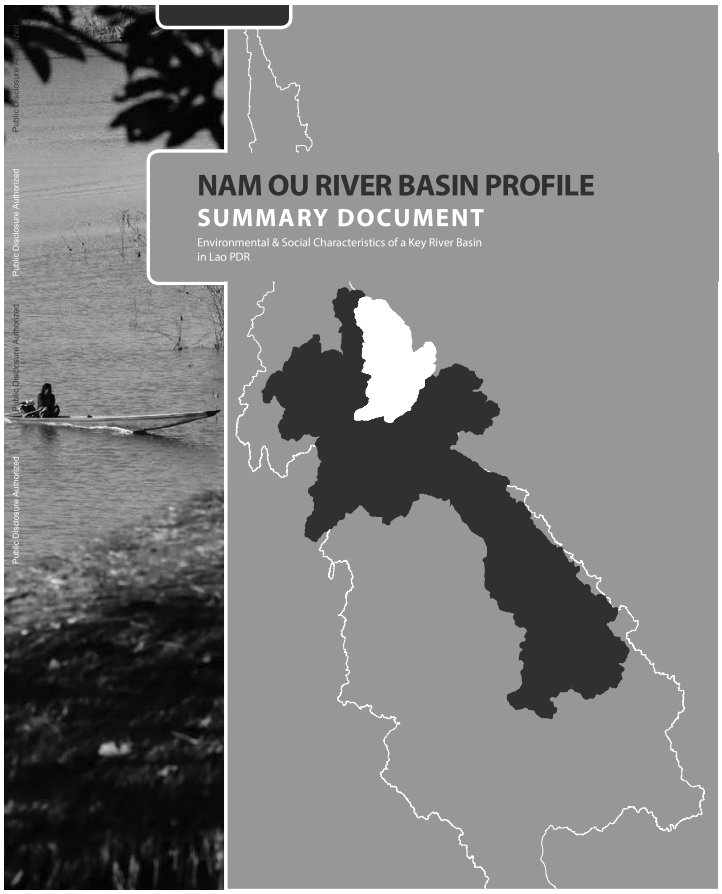

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NAM OU RIVER BASIN PROFILE
SUMMARY DOCUMENT

Environmental and Social Characteristics of a Key River Basin
in Lao PDR

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF BOXES

ACRONYMS & ABBREVIATIONS

ADB	Asian Development Bank
CIA	Cumulative Impact Assessment
COD	Chemical Oxygen Demand
DESIA	Department of Environmental and Social Impact Assessment
DO	Dissolved Oxygen
DONRE	District Natural Resources and Environment Offices
DWR	Department of Water Resources
ESIA	Environmental and Social Impact Assessment
ESL	Earth Systems Lao
FCZ	Fish Conservation Zone
FGD	Focus Group Discussions
FIPD	Forest Inventory and Planning Department
GIS	Geographic Information Systems
GOL	Government of Lao PDR
HKEC	Hydrochina Kunming Engineering Corporation
IBA	Important Bird Areas
IDOM	IDOM SA. Construction engineering company
IFC	International Finance Corporation
IUCN	International Union for the Conservation of Nature
IWRM	Integrated water resources management
KBA	Key Biodiversity Area
kW	Kilowatt
LECS	Lao Expenditure and Consumption Survey
MasI	Metres above sea level
MONRE	Ministry of Natural Resources and Environment
MRC	Mekong River Commission
Mt	Million tons
MW	Megawatt
NPA	National Protected Area
NTFP	Non-timber Forest Products
NUOL	National University of Laos
OAA	Other Aquatic Animals
PONRE	Provincial Natural Resources and Environment Offices
SI	Sinuosity Index
Total N	Total Nitrogen
Total P	Total Phosphorous
UNECE	United Nations Economic Commission for Europe
WWF	World Wide Fund for Nature

MESSAGE FROM THE DEPARTMENT OF WATER RESOURCES (DWR), MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT (MONRE)

The Nam Ou Basin Profile is a collective effort among various stakeholders at the central, provincial, district, and village levels. The Department of Water Resources (DWR) and the Provincial Offices of Natural Resources and Environment (PONRE) in Phongsaly, Oudomxay and Luang Prabang see the importance of properly managing this resource-rich river basin. We worked together with relevant stakeholders at all levels to study the physical, economic, and social characteristics of the Nam Ou Basin and its potential. We hope this Profile will be used as a reference and baseline data for the sustainable development of the Nam Ou Basin to protect its natural resources, support socio-economic development in the country, and improve the livelihoods of people living around the basin.

The DWR, a Secretariat of the Ministry of Natural Resources and Environment (MONRE) responsible for water resources management nationwide, PONRE, and the District Offices of Natural Resources and Environment (DONRE) in Phongsaly, Oudomxay, and Luang Prabang have agreed with the data, information, and approaches set out in this Profile. We expect that relevant stakeholders will use this Profile for the planning, management, and development of the Nam Ou Basin. The primary data of this Profile were collected through a field survey between January and February 2016, while the secondary data and information were collected from relevant sectors at all levels between 2013 and 2016.

We would like to sincerely thank the consultants and technical experts from different sectors at both the central and local levels for sharing their knowledge, data, information, time, and efforts in the preparation of this Profile. Special thanks to the International Finance Corporation for its technical assistance and support, and the Australian and Japanese governments for their financial assistance in its development.

Director General, Department of Water Resources
Phongsaly Head of PONRE, Oudomxay Head of PONRE, Luang Prabang Head of PONRE

ACKNOWLEDGMENTS

This Profile of the Nam Ou River Basin is the result of the collaborative effort of many people. The two principal authors of this Nam Ou River Basin Profile were the IFC consultants, Dr. Lilao Bouapao, who covered the socio-economic and water governance aspects and Mr. Peter-John Meynell, who covered the biophysical aspects. They were supported and guided by Mr. Thomas Boivin who was the first international consultant to IFC initiating the Profile development process in 2013, and who reviewed the document as it progressed, and who prepared the Synthesis document from this more detailed Profile.

The process of developing this Profile was guided by the Core Team with the lead of Mr. Chanthanet Bualapha, Director General, Mr. Phonesay Simmalavong, Deputy Director General, and Ms. Sengphasouk Xayavong, Project Coordinator, and the IFC staff Ms. Kate Lazarus and Ms. Amphavanh Sisouvanh.

There are many staff from the Provincial and Districts Offices of Natural Resources and Environment provided important contribution throughout the process of Profile development, including planning, primary and secondary data collection. These include Mr. Phonexay Leck (Phongsaly), Vixay Boualaxin (Oudomxay), and Doungvut Phonthajuck (Luangprabang). The full list of members of the team are provided at the end of the report.

There were five teams for the household and village surveys in each of the provinces and these included the government staff from DWR, PONRE, DONRE. Five independent enumerators contributed to the surveys and data entry, providing important inputs into the quality control and quality assurance.

Fisheries information was derived from original research carried out by Dr. Phouvin Phousavanh of the National University of Laos (NUOL), who developed the Guide to the Nam Ou Fish species and the Fish Poster used in discussions with villagers, during the field surveys. Geographic Information System (GIS) analysis and mapping was provided by Ms. Penroong Bamrungrach, Mr. Inthanongxay Haungbundit (DWR) and Mr. Philip Knight for the mapping of ecologically sensitive areas in the Nam Ou. We would also like to thank Pierre Dubeau for his assistance with preparation of this summary Profile.

Without the participation of local people of the sample villages, this Profile would not have been completed. 1,500 villagers responded in detail to the long questionnaires. Many villages chiefs, representatives of village mass organizations, fishers, farmers, traders and ordinary villagers participated in focus group discussions.

Funding for this Nam Ou River Basin Profile came from the Australian Government and the Japanese Government and the overall process was implemented and managed by IFC with the Department of Water Resources.

THE NAM OU HIGHLIGHTS

The Nam Ou Basin is located within the boundaries of 3 Provinces: Phongsaly, Oudomxay and Luang Prabang. However, not all areas of the 3 provinces fall within the hydrological boundaries of the Nam Ou Basin. There are 17 Districts within the Nam Ou basin, 7 in Phongsaly, 6 in Oudomxay and 4 in Luang Prabang. All districts in Phongsaly are in the Nam Ou Basin, as well as nearly all villages in the province. Phongsaly and Luang Prabang Provinces include the mainstream Nam Ou and territory within the 5km corridor of the river; only tributaries of the Nam Ou are in Oudomxay Province.

11 Major tributaries

Consists of **3** provinces of the Lao PDR:
Phongsaly, Oudomxay and Luang Prabang.
In 2015, the total population in these 3 provinces was 885,200.

5,554 ha of water bodies
(total area estimated)

404,094 people (45.7%) live within the basin boundaries

139 species of fish

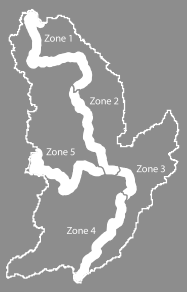
112,409 ha of agricultural land
over 39,000 cattle, 37,000 buffalo, and 121,000 pigs

14,596 km²
of combined natural forest lands

Field survey of

1,500 households in **75** villages

8 case study villages, selected along a 5-km corridor of the Nam Ou River in 5 Zones



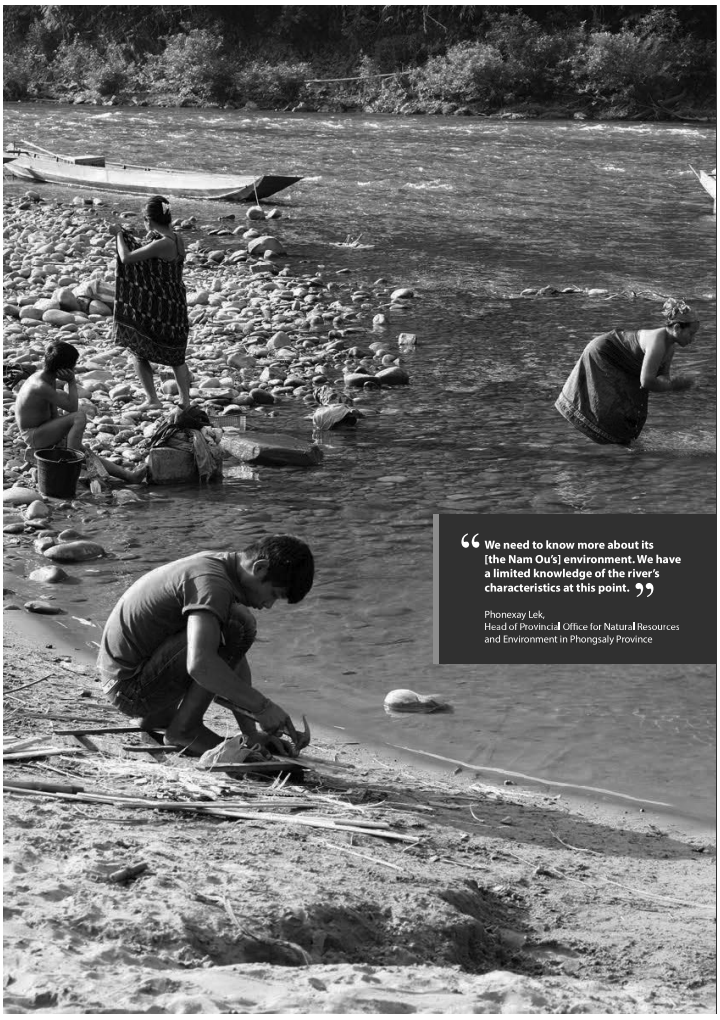
70%
of the sampled households are fishing in the Nam Ou
or one of its tributaries in the previous 12 months before the survey.

90% in Zone 1

80% in Zones 2 and 3

>5% of household heads are females

Just over half of the villages surveyed in Phongsaly (53.9%) had access to electricity. Although access is much higher in Oudomxay (74.0%) and Luang Prabang (71.0%), the electrification rate in these provinces is among the lowest in the country.



> **We need to know more about its [the Nam Ou's] environment. We have a limited knowledge of the river's characteristics at this point.**
>
> Phonexay Lek,
> Head of Provincial Office for Natural Resources and Environment in Phongsaly Province

1.0

THE NAM OU JOURNEY: AN INTRODUCTION

The main objective of the Nam Ou River Basin Profile is to compile and present available background information on the Nam Ou Basin, one of the most important river systems in Lao PDR. It aims to provide baseline data for monitoring changes and comparing past and future trends for the planning and management of: (i) water resources allocation, (ii) hydropower development, (iii) community livelihoods, and (iv) emergency responses. The Profile was developed in collaboration with Government of Lao PDR water resource managers at the national, provincial and district levels.

This compilation of data and information will further our understanding of the Nam Ou in relation to the Mekong River and the knowledge gained may be applied to other river basins and sectors in Lao PDR. Water basin managers around the country can use this Profile as a tool for developing a management plan for the Nam Ou Basin in the future.

In addition to providing a comprehensive Profile of the Nam Ou River Basin, this document also includes conclusions and recommendations for further action. The full version of the Profile, including all data and information collected and analyzed, case studies, and the Nam Ou fish poster, may be obtained from IFC's website: ifc.org/hydroadvisory.

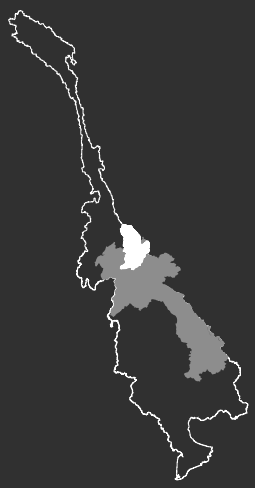
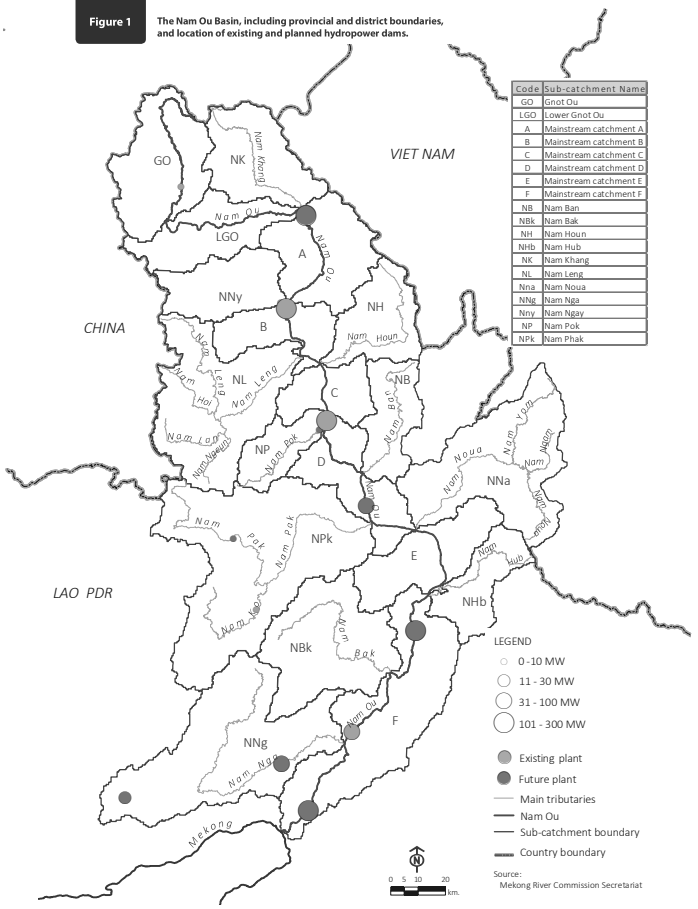


Figure 1 The Nam Ou Basin, including provincial and district boundaries, and location of existing and planned hydropower dams.



Code	Sub-catchment Name
GO	Gnot Ou
LGO	Lower Gnot Ou
A	Mainstream catchment A
B	Mainstream catchment B
C	Mainstream catchment C
D	Mainstream catchment D
E	Mainstream catchment E
F	Mainstream catchment F
NB	Nam Ban
NBk	Nam Bak
NH	Nam Houn
NHb	Nam Hub
NK	Nam Khang
NL	Nam Leng
NNa	Nam Noua
NNg	Nam Nga
NNy	Nam Ngay
NP	Nam Pok
NPk	Nam Phak

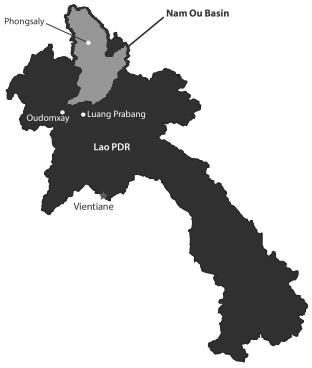
1.1 NAM OU IN BRIEF

The Nam Ou is one of the most important and significant tributaries of the Lower Mekong Basin. Lying in the far north of Lao PDR with its source near the Lao-Chinese border (Figure 1), the Nao Ou is 485 km[1] long and flows from north to south through three provinces – Phongsaly, Oudomxay, and Luang Prabang. It meets the Mekong River about 25 km upstream from Luang Prabang city.

The Nam Ou has the largest catchment area in Lao PDR, which includes nearly 26,000 km^2 of mountainous terrains and uplands, flowing through a mostly rocky channel in a relatively narrow river valley. There are 11 major tributaries that enter the Nam Ou along its length, the largest of which are the Nam Phak, the Nam Bak, and the Nam Nga; one of the tributaries, the Nam Noua, arises in Vietnam near the town of Dien Bien Phu. Thus, the Nam Ou is a transboundary river of both national and international importance. Its flow contribution to the Mekong has been estimated at 610 m^3/sec, making it the third most important tributary of the Mekong in Lao PDR.

Over 500,000 people live in the Nam Ou Basin, the third-largest in Lao PDR after the Xebang Hieng and Nam Ngum basins. The river has been home to a number of cultures for several centuries, including the Khmu, Akha, Songsiri, Hmong, Lue, and Lao ethnic groups. Local people rely on the Nam Ou for their livelihoods, including water supply, agriculture, fisheries, and navigation.

[1] The Nam Ou River's length based on GIS measurements from the source, carried out by this Profile.



Box 1

What is a River Basin Profile?

A River Basin Profile provides baseline information on the physical, biological, social, and cultural aspects of a river basin; such information can be used for the future management and conservation of natural resources within the basin. For the Nam Ou, its Profile includes a compilation of available information on the river supplemented with primary data collected through field and household surveys as well as case studies conducted between January and February 2016. The Profile provides analysis of environmental and social trends in the Nam Ou over time and recommendations on how to address management challenges from ongoing and planned hydropower, irrigation, and other water-resource developments.

The purpose of developing the Nam Ou River Basin Profile is to:

- ✓ Provide a greater understanding of the characteristics of the whole basin, including sub-basins.
- ✓ Provide documentation for river-basin planners.
- ✓ Enable the Government of Lao PDR, the private sector, local authorities, and communities to better manage the river and its resources for future generations.

The hydropower potential of the river is being developed. Out of a cascade of seven large hydropower projects, three became operational during 2016 and the remaining four will be completed by 2020. The projects will have a combined reservoir length of 350 km and an installed capacity of 1,272 megawatts (MW). The Nam Ou hydropower cascade and other planned developments will result in significant changes to the natural state of the river, which will impact the livelihoods and cultures of people in the basin. The Nam Ou River Basin Profile is a timely effort to document the current status of the river and provide the required baseline information for future river basin planning and management.

1.2 SIGNIFICANCE OF THE NAM OU IN THE MEKONG

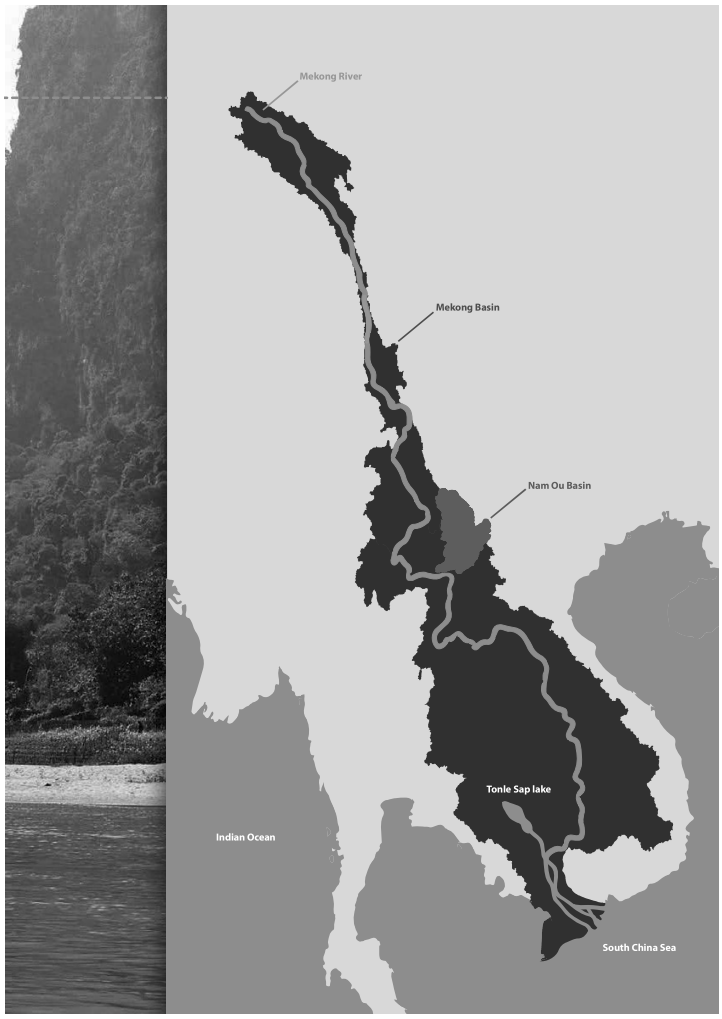
Box 2

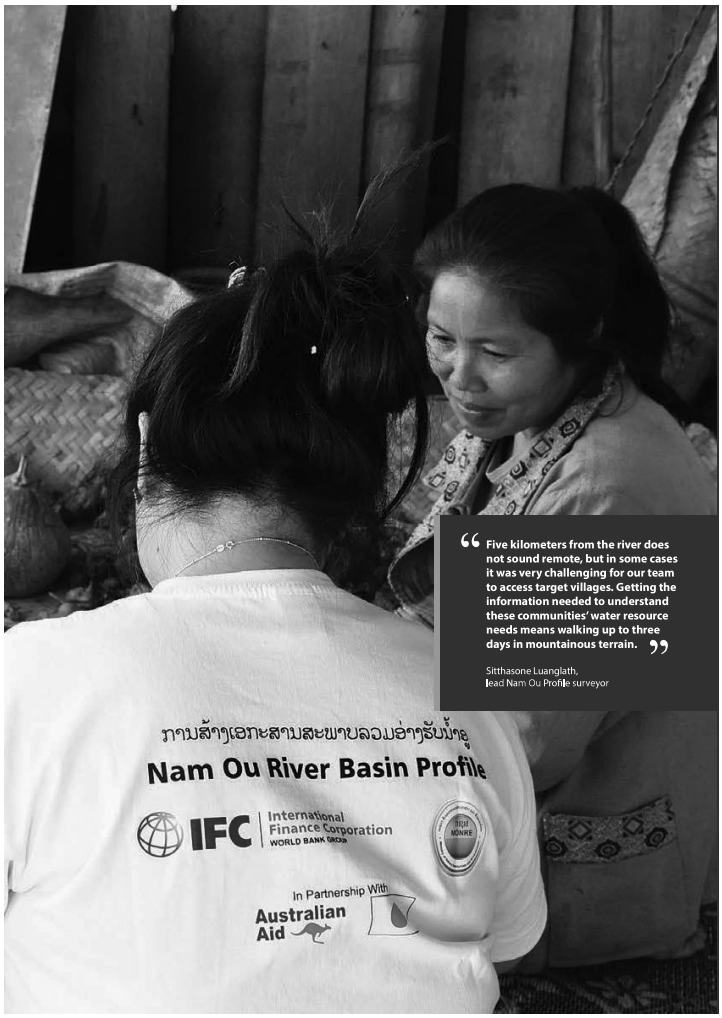
Significance of the Nam Ou in the Mekong

In 2009, the Mekong River Commission (MRC) initiated a series of studies to consider the significance of the tributaries of the Mekong. The findings confirmed the importance of the Nam Ou based on the following criteria:

- **Catchment size and transboundary nature** – The Nam Ou, with a total area of nearly 26,000 km^2, is the 10th largest river basin in the Lower Mekong. Approximately 95% of the river basin lies in Lao PDR and the remaining 5% is in Vietnam on the Nam Noua, a tributary of the Nam Ou. The source of the Nam Ou arises in Lao PDR very close to the Chinese border.
- **Geology** – The Nam Ou has the fifth-highest proportion of limestone among Mekong tributaries, after the Nam Suong, the Nam Khan, the Nam Kading, and the Se Bang Fai. It also has a very high density of cave formations.
- **Flows** – Its mean annual flow ranks seventh among Mekong tributaries, contributing about 3.5% of the Mekong's total flow, including 3.5% during the wet season and 2.5% during the dry season.
- **Sediment load** – The Nam Ou contributes about 4.8% of sediments in all the catchments of the Lower Mekong Basin, second in Lao only after the Nam Ngum.
- **Aquatic health** – According to the MRC's aquatic health index, the Nam Ou is in the top 80th percentile in terms of overall river health, second only to the Nam Khan and above the Nam Ngum.
- **Aquatic ecology** – The Nam Ou ranks eighth in terms of protected areas with more than 7% its catchment within the Phou Den Din and Phou Hiphi National Protected Areas (NPA). It is a recognized biodiversity hotspot with a variety of endemic and threatened fish species and serves as an important migration corridor providing key fish spawning, nursery, and feeding grounds.
- **Hydropower potential** – Its hydropower potential, in terms of gigawatt hours produced per year, ranks fourth among the Mekong tributaries, after the Sekong, the Nam Kading, and the Nam Ngum. It represents 7.8% of the potential installed capacity of the Mekong tributaries.
- **Fisheries yield** – The Nam Ou places 13th in terms of fisheries and other aquatic organisms (OAA) yield per year. However, this may be the result of a lack of accurate fish harvest data and relatively lower numbers of people in the basin compared to other major river systems in Lao PDR; expected fish and OAA yields are likely much higher than currently reported.
- **Land use** – The Nam Ou ranks fourth in terms of natural land cover, after the Sekong, the Tonle Sap, and the Nam Mun. Its percentage of agricultural land is 14th among all the Mekong tributaries.
- **Navigation** – The Nam Ou ranks second in terms of navigation importance, after only the Sekong. Local residents can transport up to 2,000 kg per boat in the wet season and 500 kg per boat in the dry season.

Sources: MRC (2007), MRC (2009), Meynell (2012).


Mekong River
Mekong Basin
Nam Ou Basin
Tonle Sap lake
Indian Ocean
South China Sea


“Five kilometers from the river does not sound remote, but in some cases it was very challenging for our team to access target villages. Getting the information needed to understand these communities’ water resource needs means walking up to three days in mountainous terrain.”
Sitthasone Luanglath,
lead Nam Ou Profile surveyor
ການສ້າງເອກະສານສະພາບລວມອ່າງຮັ ນ້ຳ ງ
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