



# Technical Assistance Report

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Project Number: 39536  
December 2005

Technical Assistance  
Socialist Republic of Viet Nam:  
Capacity Building in the Strategic Environmental  
Assessment of the Hydropower Project  
(Financed by the Government of Finland)

## CURRENCY EQUIVALENTS

(as of 23 November 2005)

Currency Unit	–	dong (D)
D1.00	=	\$0.000063
\$1.00	=	D15,905

## ABBREVIATIONS

ADB	–	Asian Development Bank
DONRE	–	department of natural resources and environment (provincial)
CIA	–	cumulative impact assessment
EIA	–	environmental impact assessment
EVN	–	Electricity of Viet Nam
GMS	–	Greater Mekong Subregion
MONRE	–	Ministry of Environment and Natural Resources
MPI	–	Ministry of Planning and Investment
NGO	–	nongovernment organization
NPTESP	–	Northern Power Transmission Expansion Sector Project
SEA	–	strategic environmental assessment
SLHPP	–	Son La Hydropower Project
TA	–	technical assistance

## TECHNICAL ASSISTANCE CLASSIFICATION

Targeting Classification	–	Targeted intervention
Sector	–	Energy
Subsector	–	Energy sector development
Theme	–	Capacity building, environment
Subthemes	–	Natural Resources conservation, environmental policy and legislation
Targeting Classification (Targeted intervention)	–	Institutions targeting. The TA project is designed to create outputs that are directly targeted to build the capacity of institutions involved in hydropower generation projects in Viet Nam, to ensure environmental sustainability.

## NOTE

In this report, "\$" refers to US dollars.

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<b>Director General</b>	R. Nag, Mekong Department
<b>Director</b>	J. Cooney, Infrastructure Division, Mekong Department
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## I. INTRODUCTION

1. The Government of the Socialist Republic of Viet Nam (the Government) requested assistance from the Asian Development Bank (ADB) in the capacity building of the Ministry of Natural Resources and Environment (MONRE) and Electricity of Viet Nam (EVN) for the strategic environmental assessment (SEA) of the hydropower sector. The Management cleared the TA concept paper on 16 September 2005. A fact-finding mission visited Viet Nam and reached an understanding with the Government on the objective, scope, costs, financing, and implementation arrangements for the technical assistance (TA).<sup>1</sup> The design and monitoring framework is in Appendix 1.

2. The TA focuses on building the capacity of MONRE and EVN in the hydropower sector to achieve sustainable energy development in Viet Nam. The sector, theme, and targeting classification of the TA is in Appendix 2. The TA is targeted at building the SEA capacity of MONRE and EVN in hydropower project development. It is in line with MONRE's current policy to amend its legislative requirements to include the SEA mandate. Additionally, the TA is consistent with an ADB-led donors' effort to harmonize the environmental safeguard requirement to reflect the country system in Viet Nam, and other documents.<sup>2</sup>

3. The implementation of the proposed TA is linked to the processing of the proposed Northern Power Transmission Expansion Sector Project (NPTESP) and the Song Bung 4 Hydropower Project. Capacity for SEA review and monitoring in MONRE will help the Government understand and manage better the impact of the hydropower sector. EVN capacity in SEA preparation can also be extended to other power projects in Viet Nam.

## II. ISSUES

4. Electricity demand in Viet Nam has grown at an annual rate of 15% between 2000 and 2005 and will continue to grow at this rate until 2010, and at 12% until 2015. To meet this demand for electricity, the Government expects to double currently installed generating capacity from 10,871 megawatt (MW) in 2004 to 22,600 MW by 2010. In addition, the capacity of high-voltage and medium-voltage transmission and distribution systems needs to be improved to address transmission bottlenecks and reduce losses. The power sector master plan of EVN for 2000–2010 emphasizes the importance of developing hydropower along with other generation technologies, mainly because of the country's abundant water resources potential and the cheaper generation cost. However, large hydropower projects like the Son La and Son Bung 4 hydropower plants are expected to have significant environmental and social impacts, including cumulative impacts downstream.

5. ADB's past involvement in the power sector in Viet Nam has focused on the extension and rehabilitation of substations and distribution networks. To support EVN's long-term need for growth in generation and distribution capacity, ADB approved the \$120 million Northern Power Transmission Sector Project to improve the reliability and quality of supply of a high-voltage transmission network in the Northern Region. A follow-up project, the NPTESP, is being prepared to further strengthen the transmission network and enable the evacuation of power from generation projects now being constructed, improve North–South transmission, and reduce system losses. Further ADB assistance to the sector will be for power generation projects like the Song Bung 4 Hydropower Project. Since ADB's focus in the power sector over the next 5–10 years will be in power generation, there is a need to

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<sup>1</sup> The TA first appeared in *ADB Business Opportunities* (internet edition) on 18 September 2005.

<sup>2</sup> ADB. 2005 *Country Strategy Program Update (2006–2008): Viet Nam*. Manila

assist the country in building its capacity to understand and address comprehensively the impact of such projects, and support sustainable power sector development. MONRE has indicated strong interest in capacity building in cumulative impact assessment (CIA) as part of overall strategic environmental assessment, especially in the hydropower sector. EVN has also acknowledged its limited capacity in CIA preparation and requested assistance.

6. A discussion paper on CIA was circulated within ADB in March 2005 and shared with other development partner. CIA, as part of SEA, can be defined as examining the aggregate indirect, induced, synergistic, and trans-boundary impact on the environment of planned and identified development projects in the same geographic region within a specified time frame. A CIA can be both evaluative (for a project or series of projects) and advisory (for comprehensive development purposes). For a region like a watershed area, it is beneficial to understand the overall cumulative impact of the major planned interventions and use the results to guide future planning. The SEA, as an overarching assessment approach, focuses on examining the impact of either sector-wide or program-/policy-based development by using tools like CIA and other assessment methods. The outcome of an SEA generally provides policy makers with insights into the overall environmental impact, alternatives, and risks of the sector (e.g., hydropower) or program development at the policy level.

7. Both EVN and MONRE have requested assistance from ADB in SEA and CIA, especially for projects that are directly financed by ADB and other donors or linked to projects (such as transmission lines) financed by them. The hydropower sector was selected for the SEA/CIA exercise because EVN aims to develop its capacity through active involvement in this sector in the next 5 years, given the sector's identified importance in the Government's Master Plan V (2000–2010) and the National Hydropower Plan. In addition, ADB's Energy Policy recognizes the value of hydropower as a renewable resource appropriate for ADB support, provided safeguard requirements are addressed. Building the capacity of EVN in SEA/CIA will help it to plan sounder projects with comprehensive consideration of risk and impact. In the case of MONRE, capacity building will help the ministry make strategic policy decisions on mitigation and project review/approval. The pilot SEA/CIA studies in the TA could become showcases for the planning and development of future power projects.

### **III. THE TECHNICAL ASSISTANCE**

#### **A. Impact and Outcome**

8. The purpose of the TA is to (i) build the capacity of relevant Vietnamese agencies (chiefly MONRE and EVN and its related agencies) to enhance their performance in SEA preparation, review, approval, and implementation; (ii) ensure that the capacity building is sustainable so that future projects and development programs may benefit from the accumulated experience of MONRE and EVN; and (iii) share the lessons learned with other development partners including donors, civil society, and nongovernment organizations (NGOs). The overall purpose is to support a long-term hydropower development scheme that is sustainable, environmentally sound, and sensitive to the overall impact and risks. This TA will complement the proposed ADB TA for the implementation of an environmental management plan for the Song La Hydropower Project.

9. The proposed TA project will focus on the following outputs: (i) assessment of the need for CIA/SEA capacity; (ii) capacity-building activities, including on-the-job training and a study tour; (iii) common understanding of the methods, coverage, and directions of the pilot CIAs/SEAs through the collection and analysis of such practices in the hydropower sector; (iv) pilot CIA/SEA studies for targeted areas and projects; (v) review workshops;

- (vi) dissemination of information and public disclosure of adequately prepared reports; and
- (vii) regular follow-up of the staff's capacity-building results.

## **B. Methodology and Key Activities**

10. Various methods such as desk reviews, field surveys, workshops, policy dialogues, and consultations will be used to achieve the intended TA outputs. Since the pilot CIA/SEA studies are considered case studies, specific case study methods will be used. The participatory approach will be given priority when developing mitigation programs and policy recommendations as part of the CIA/SEA results. The TA will be implemented over 12 months, with its first activity being the establishment of a steering committee. The committee members will come from MONRE, Ministry of Interior, Ministry of Planning and Investment (MPI), Ministry of Agriculture and Rural Development, Ministry of Fisheries, provincial departments of agriculture and rural development and natural resources and environment, provincial and district people's committees, and EVN.

11. A team of consultants will provide technical assistance services to implement the Project. One out of two areas now being considered will be chosen as pilot area for the CIA/SEA capacity-building activities. The first is the Da River basin in Northern Viet Nam; the other is the Vu-Gia Thu Bon River basin in Central Viet Nam. The Da River basin is being considered not only because many donors (including ADB) have planned or committed interventions in the basin and need to understand the cumulative impact of each intervention on overall development, but also because the river basin contains many environmentally sensitive protected areas with high biodiversity values. The largest hydropower station planned for the country, the Son La Hydropower Project (SLHPP), is in that basin as part of the master plan for the hydropower development cascades of the Da River. The Vu-Gia Thu Bon River basin, on the other hand, could also be a pilot area because ADB is considering financing the Song Bung 4 Hydropower Project, one of several hydropower projects in the river basin that could have comprehensive impact downstream of the dam site. The river basin is also in a biodiversity conservation corridor with high ecological values that was endorsed by the GMS summit in June 2005.

12. The TA activities will specifically involve (i) assessing the weaknesses and needs of both MONRE and EVN in CIA/SEA capacity (including a review of existing studies); (ii) reviewing relevant policies and legislation (and recent studies on them) to identify gaps and opportunities in conducting CIAs/SEAs in the current Vietnamese institutional context; (iii) reaching common understanding on the specific pilot area, methods, coverage, and directions of the pilot CIAs/SEAs through the collection and analysis of such practices in the hydropower sector; (iv) conducting pilot CIA/SEA studies in the identified pilot area; (v) identifying appropriate roles for the MONRE and EVN organization and staff in CIA/SEA, and suggesting opportunities to strengthen those roles with the involvement of the provincial departments of natural resources and environment (DONREs); (vi) training MONRE/EVN staff, with emphasis on practical on-the-job experience; (vii) organizing workshops to review the pilot study reports and disseminate the results; (viii) organizing a regional study tour for selected staff of MONRE, EVN, and relevant agencies such as DONREs (for maximum value and complementarity, the study tour will be integrated with the study tour for another TA for EVN's Son La environmental management plan); (ix) procuring key project equipment including relevant geographical information system (GIS) and other facilities; and (x) providing recommendations for ADB's operations in Viet Nam, and outreach to partners (including donors and civil society) to disseminate the policy recommendations.

13. An updated list of planned and committed interventions from donors and the Government will be compiled and the relevant documents will be reviewed against the

overall development scenario. The pilot study will be done in one of the two river basins now being considered, and its coverage will be up to 2025. The study will include (i) an overall assessment of the cumulative impact of all interventions planned and committed; (ii) an assessment of the specific contribution of the ADB's proposed interventions; (iii) policy recommendations to MPI and donors; and (iv) consultations with relevant stakeholders and NGOs. The interventions referred to will be selected at the start of the TA and the selections will be confirmed by ADB. Policy recommendations will involve specific statements on the potential impact of the identified projects and the needed mitigation measures. Consultations will be held in selected provinces and Hanoi, and will be documented. As part of the efforts to reach a common understanding on CIA/SEA approaches, ADB in 2004 started a pilot CIA exercise, one of its first, for the Nam Theun II Hydropower project in the Lao People's Democratic Republic, with particular focus on hydrology, conservation, fishery, transport, and urban development. The lessons learned from that exercise will be used in the proposed pilot activities under the TA. The extensive SEA experiences of the People's Republic of China can also very well be shared during the TA.

14. The consultants will provide interim and final reports, and disseminate summary reports (in both Vietnamese and English) to stakeholders through workshops and Web sites after approval by ADB, as part of the public communication and disclosure process.

### **C. Cost and Financing**

15. The TA total cost is estimated at \$650,000 equivalent—\$400,000 in foreign exchange cost and \$250,000 in local currency cost. The Government has requested ADB to finance \$475,000 equivalent, comprising the entire foreign exchange cost and a portion of the local currency cost. This amount will be financed on a grant basis by the Government of Finland and administered by ADB. The Government of Viet Nam will finance the remaining \$175,000 equivalent in local currency cost through in-kind contributions. Detailed cost estimates and a financing plan are in Appendix 2.

### **D. Implementation Arrangements**

16. The Executing Agency for the TA will be MONRE, and EVN will co-chair the steering committee to be formed for the TA. The TA, to be implemented over 12 months, from December 2005 to December 2006, will require 25 person-months of consulting services—13 person-months of international consulting services and 12 person-months of domestic consulting services. The consultants will be recruited according to ADB's *Guidelines for the Use of Consultants* and other arrangements acceptable to ADB for engaging domestic consultants. The outline terms of reference for the consultants are in Appendix 3.

## **IV. THE PRESIDENT'S DECISION**

17. The President, acting under the authority delegated by the Board, has approved ADB administering technical assistance not exceeding the equivalent of \$475,000 to the Government of Viet Nam to be financed on a grant basis by the Government of Finland, for Capacity Building in the Strategic Environmental Assessment of the Hydropower Sector, and hereby reports this action to the Board.

## DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<p><b>Impact</b></p> <p>Environmentally sensitive power generation development with emphasis on sustainable development</p>	<p><b>Five years after the TA:</b></p> <p>SEA/CIA of hydropower projects has been systematically adopted, and the review and approval process is established in MONRE</p>	<p>Regulations of the Government of Viet Nam on hydropower generation projects and environmental assessment for SEA</p>	
<p><b>Outcome</b></p> <p>Best SEA/CIA practice is delivered and monitored</p> <p>Adequate SEA/CIA capacity is built in MONRE/EVN.</p> <p>Ensuring environmental sustainability as an MDG</p>	<p><b>After the TA:</b></p> <p>The SEA/CIA best practice is recognized and accepted by MONRE/EVN.</p> <p>EVN becomes sensitive to and professionally capable of developing SEAs/CIAs</p> <p>MONRE becomes familiar with the SEA/CIA review process</p> <p>Natural resources, ecosystem, and biodiversity are better conserved</p>	<p>Consultants' reports, monitoring reports, and feedback from the steering committee, and decision by EVN and MONRE to adopt them systematically</p> <p>Consultant reports, monitoring reports, and feedback from the steering committee</p>	<p><b>Assumptions</b></p> <p>The Government is committed to implementing the SEA/CIA on a pilot basis</p> <p>Steering committee participates fully</p> <p><b>Risk</b></p> <p>Reluctance of MONRE or EVN to adopt the TA results</p>
<p><b>Outputs:</b></p> <p>Needs assessment</p> <p>Capacity-building activities, including on-the-job training and study tour</p> <p>Pilot CIA/SEA studies</p> <p>Review workshops</p>	<p><b>During TA implementation:</b></p> <p>Delivery of needs assessment</p> <p>Delivery of capacity-building activities is timely and adequate in quality</p> <p>Pilot studies are timely and of good quality</p>	<p>Review at the workshops and by staff</p> <p>Review at the workshops and by staff and steering committee</p> <p>Review of the TA results at the workshops</p>	<p><b>Assumptions</b></p> <p>Government is willing to disclose all information on environmental and social impact</p> <p>Environmental, social, and institutional data are available</p> <p><b>Risk</b></p> <p>SEA/CIA may affect MONRE/EVN's original way of doing business and may therefore face resistance</p>

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<p>Dissemination of information and public disclosure of reports</p> <p>Regular follow-up of the staff's capacity-building results</p>	<p>Workshops are held and are well attended</p> <p>Information is disclosed to relevant stakeholders and uploaded to Web site</p> <p>Timetable and follow-up activities are implemented</p>	<p>Workshop timing and preparedness</p> <p>Successful disclosure and Web site upload</p> <p>Review at the workshops and by staff and steering committee</p>	<p><b>Assumption</b> Steering committee members allocate enough time to work closely with staff and TA consultants</p> <p><b>Risk</b> Workshops not attended by anticipated key participants</p>
<p style="text-align: center;"><b>Activities with Milestones</b></p> <p><b>Dec 2005–Jan 2006</b></p> <ul style="list-style-type: none"> <li>- Assessment of CIA/SEA capacity weaknesses and needs.</li> <li>- Review of relevant policies and legislation to identify gaps and deficiencies in conducting CIA/SEA in the current Vietnamese institutional context.</li> </ul> <p><b>Dec 2005–June 2006</b></p> <ul style="list-style-type: none"> <li>- Formulation of TORs for the SEA studies, for the review and approval of ADB and the steering committee.</li> <li>- Pilot CIA/SEA studies of in identified areas.</li> </ul> <p><b>May–October 2006</b></p> <ul style="list-style-type: none"> <li>- Training of MONRE/EVN staff, with emphasis on practical on-the-job experience.</li> <li>- Regional study tour for selected staff of MONRE, EVN, and relevant agencies.</li> <li>- Procurement of key project equipment, including relevant GIS and other facilities.</li> </ul> <p><b>June–Dec 2006</b></p> <ul style="list-style-type: none"> <li>- Workshops to review and disseminate the results of the pilot studies.</li> <li>- Recommendation of policies for ADB's operations in Viet Nam, and outreach to partners (including donors and the civil society) to disseminate the policy recommendations.</li> </ul>			<p style="text-align: center;"><b>Inputs</b></p> <p>About 25 person-months of local consultants and 24 person-months of international consultants,</p> <p>Assistance of local support staff with other costs as presented in Appendix 3</p>

CIA = cumulative impact assessment, EVN = Electricity of Viet Nam, MDG = Millieum Development Goals, MONRE = Ministry of Environment and Natural Resources, SEA = strategic environmental assessment, TA = technical assistance

**COST ESTIMATES AND FINANCING PLAN**  
(\$'000)

Item	Foreign Exchange	Local Currency	Total Cost
<b>A. Government of Finland Financing<sup>a</sup></b>			
1. Consultants			
a. Remuneration and Per Diem			
(i) International Consultants	260.0	0.0	260.0
(ii) Domestic Consultants	0.0	30.0	30.0
b. International and Local Travel	20.0	5.0	25.0
c. Reports and Communications	10.0	5.0	15.0
2. Training, study tours, and workshops including steering committee meetings	10.0	5.0	15.0
3. Surveys <sup>b</sup>	20.0	10.0	30.0
4. GIS and Other Equipment <sup>c</sup>	30.0	10.0	40.0
5. Miscellaneous Administration and Support Costs	10.0	2.0	12.0
6. Contingencies	40.0	8.0	48.0
<b>Subtotal (A)</b>	<b>400.0</b>	<b>75.0</b>	<b>475.0</b>
<b>B. Government of Viet Nam Financing</b>			
1. Office Accommodation and Transport	0.0	60.0	60.0
2. Remuneration and Per Diem of Counterpart Staff	0.0	100.0	100.0
3. Others	0.0	15.0	15.0
<b>Subtotal (B)</b>	<b>0.0</b>	<b>175.0</b>	<b>175.0</b>
<b>Total</b>	<b>400.0</b>	<b>250.0</b>	<b>650.0</b>

GIS = geographical information system.

<sup>a</sup> Administered by the Asian Development Bank.

<sup>b</sup> Surveys of water quantity and quality, ecosystem, and biodiversity.

<sup>c</sup> Computers, geographical information system, and relevant monitoring and sampling equipment.

Sources: Government of Viet Nam and Asian Development Bank estimates.

## OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The technical assistance will require 25 person-months of consulting services—12 person-months of international consulting services and 13 person-months of domestic consulting services.

**A. Environmental Planner/Team Leader** (international; 5 person-months)

2. **Required Qualifications.** The international environmental planner/team leader should have a background in environmental science or engineering, regional or urban planning, or water resources management and planning; be familiar with environmental impact assessment theories and practices including strategic environmental assessment (SEA); and have regional and subregional (Greater Mekong Subregion) experience.

3. **Description of Responsibilities:**

4. **Team Leadership.** The expert will do the following: The consultant will manage and lead the team in accomplishing the following tasks:

- (i) Deliver interim and final reports on time and with adequate quality.
- (ii) Deliver the review and training workshops and other capacity-building activities.
- (iii) Train the staff of the Ministry of Environment and Natural Resources (MONRE) and Electricity of Viet Nam (EVN).
- (iv) Ensure that the steering committee's guidance and comments from the public consultations are reflected in the project results.

5. **Strategic Environmental Assessment/Cumulative Impact Assessment.** The expert will do the following:

- (i) Review policies and legislation to identify gaps and opportunities in conducting SEA in the Vietnamese institutional context, as part of the needs assessment.
- (ii) Review general social and economic trends that may affect development in the selected pilot areas and particularly in the hydropower sector.
- (iii) Formulate terms of reference for the pilot SEA/CIA studies on the basis of the development scenario for hydropower projects and other development activities.
- (iv) Compile and review an updated list of planned and committed interventions and the relevant documents against the overall development context.
- (v) Conduct pilot SEA/CIA studies in the identified areas.
- (vi) Recommend policies for ADB's operations in Viet Nam on the basis of the study results, and perform outreach to partners (including donors and the civil society) to disseminate the policy recommendations.
- (vii) Develop frameworks for a monitoring system and improved performance indicators for the two project areas.

6. **MONRE/EVN Capacity Building and Training.** The expert will do the following:

- (i) Identify appropriate roles for MONRE and EVN staff in CIA/SEA and suggest opportunities to strengthen the structure and staff.
- (ii) Train the staff of MONRE and EVN with timely and adequate training materials.
- (iii) Conduct capacity-building activities, including on-the-job training and selected study tours, under the guidance of the steering committee.
- (iv) Formulate a mechanism for monitoring and evaluating the effectiveness of the capacity-building activities.

**B. Aquatic Ecologist** (international; 1.5 person-months)

7. **Required Qualifications.** The international aquatic ecologist should have a background in biology or environmental science, be familiar with the aquatic (freshwater) ecosystem; and have experience in wildlife/biodiversity conservation and management.

8. **Description of Responsibilities.** The expert will do the following:

- (i) Examine and summarize the data and literature on fishes and aquatic species in the pilot study watersheds, their biodiversity values, and endangered status.
- (ii) Collect data on aquatic species, including those in the wetlands and floodplains, as well as upstream and downstream of the pilot watersheds.
- (iii) Assess the cumulative impact of the hydropower projects and other development activities on aquatic biodiversity, including losses in the fish catch or aquaculture.
- (iv) In view of the GMS Biodiversity Conservation Corridor Initiative of ADB, review and suggest any potential conflicts or synergies with the development activities in the pilot study areas, and formulate a monitoring system and improved performance indicators compatible with the biodiversity values.
- (v) Develop specific programs to monitor and mitigate the assessed impact.
- (vi) Integrate the results of the public consultation into the overall assessment and recommend policy options for hydropower sector development.

**C. Terrestrial Ecologist** (international; 1.5 person-months)

9. **Required Qualifications.** The terrestrial ecologist should have a background in biology or environmental science, be familiar with terrestrial ecosystems; and have experience in wildlife/biodiversity conservation and management.

10. **Description of Responsibilities.** The expert will do the following:

- (i) Examine and summarize the literature on terrestrial species and vegetation in the pilot study areas, their biodiversity values, and endangered status.
- (ii) Collect data on terrestrial species including those in the wetlands and floodplains, as well as upstream and downstream areas of the pilot watersheds.
- (iii) Assess the cumulative impact of hydropower projects and other development activities on terrestrial biodiversity in various species, including losses in the indigenous peoples' livelihood based on hunting and catching.
- (iv) In view of the prospective GMS Biodiversity Conservation Corridor Initiative of ADB, review and suggest any potential conflicts or synergies with the development activities in the pilot study areas, and formulate a monitoring system and improved performance indicators compatible with the biodiversity values.
- (v) Develop specific programs to monitor and mitigate the assessed impact.
- (vi) Integrate outcomes from the public consultation into the overall assessment and recommend policy options for hydropower sector development.

**D. Hydrologist** (international; 1 person-month)

11. **Required Qualifications.** The hydrologist should have a background in hydrology, water resources, or civil engineering; experience in hydraulic modeling, and actual experience in hydropower projects. Previous work in Viet Nam is not mandatory but useful.

12. **Description of Responsibilities.** The expert will do the following:
- (i) Model the flow regime, particularly the changes in the rivers in the pilot areas, considering the proposed hydropower projects and other development activities.
  - (ii) Examine the cumulative effects in both upstream and downstream areas, including the quantity and dynamics of flow, effects on monthly and seasonal fluctuations, and influence on the communities along riverbanks.
  - (iii) Assess the cumulative impact on the hydrology of the river basins in the pilot areas, including flood location, magnitude, timing, and frequency; groundwater recharge and levels in the watersheds; and changes in physical habitats such as waterfalls, rapids, wetlands, floodplains, and backwater ecosystem.
  - (iv) Develop specific programs to monitor and mitigate the assessed impact.

**E. GIS Specialist** (international; 1 person-month)

13. **Required Qualifications.** The GIS specialist should have a background in geography, civil engineering, or natural sciences, and experience in geographical information system (GIS) application. Experience in hydropower projects.

14. **Description of Responsibilities.** The expert will do the following:
- (i) Provide spatial analyses of biodiversity, hydrology, landscapes, land use, agriculture and infrastructure features, and other environmental information for the pilot studies.
  - (ii) Produce good-quality maps of the pilot study areas and in integrating information graphically into the studies with the use of GIS techniques.
  - (iii) Work with the Vietnamese data centers and NGOs to produce thematic maps.
  - (iv) Assist in building the capacity of MONRE and EVN in GIS data analysis and presentation, as part of the CIA/SEA exercise.

**F. Mining Specialist** (international; 1 person-month)

15. **Required Qualifications.** The international mining specialist should have a background in mining, mineralogy, or natural sciences, with specific on-site experience in mining projects.

16. **Description of Responsibilities.** The expert will do the following:
- (i) Summarize existing and planned mining activities in the pilot study areas, considering the proposed hydropower projects and other development activities.
  - (ii) Examine the cumulative effects on water in both upstream and downstream areas of sediments and wastewater from waste rock disposal, mine operation and tailing facilities, mine closure, and other mining activities along rivers.
  - (iii) Assess the cumulative impact of the mining activities on the pilot areas by conducting focused investigations in selected geotechnical sites survey.
  - (iv) Develop specific programs to monitor and mitigate the impact of the assessed activities as well as future mining development in the study areas.

**G. Road Specialist** (international; 1 person-month)

17. **Required Qualifications.** The road specialist should have a background in civil or transport engineering, and specific road development experience.

18. **Description of Responsibilities.** The expert will do the following:
- (i) Summarize existing and planned roads in the study areas, considering the proposed hydropower projects and other development activities.
  - (ii) Examine the cumulative effects on water, air, and wildlife sediments, erosion, and waste spoils from road construction and development activities along rivers in both upstream and downstream areas.
  - (iii) Assess the cumulative impact of roads or transport activities on the river basins in the pilot areas by conducting focused investigations in selected sites.
  - (iv) Develop specific programs to monitor and mitigate the impact of the assessed activities as well as future transport development in the study areas.

#### H. **Environmental Specialist** (domestic; 7 person-months)

19. **Required Qualifications.** The domestic environmental specialist should have a background in environmental science/engineering, regional or urban planning, or water resources management and planning; be familiar with environmental impact assessment theories and practices; and have experience with power projects.

20. **Description of Responsibilities.** Under the guidance of the team leader, the domestic environmental specialist will have the following responsibilities:

- (i) Coordinate and communicate with other members of the team and with the steering committee members and stakeholders to achieve the tasks.
- (ii) Assist the team leader in delivering timely interim and final reports.
- (iii) Assist the team leader in delivering the review and training workshops, and other capacity-building activities like the study tour.
- (iv) Assist the team leader in ensuring that guidance from the steering committee and comments made in public consultations are reflected in the project results.
- (v) Coordinate with MONRE and EVN and related agencies to obtain relevant information and documents, and have these translated adequately.
- (vi) Assist in reviewing policies and legislation to identify gaps and deficiencies in conducting CIA/SEA in the current Vietnamese institutional context.
- (vii) Assist in formulating terms of reference for the pilot SEA/CIA studies.
- (viii) Assist the team leader in conducting pilot study in identified area.
- (ix) Coordinate with various stakeholders to implement the training workshops.
- (x) Assist the team leader in delivering the training workshops and related capacity-building activities, including timely and adequate training materials.
- (xi) Assist in delivering capacity-building activities including on-the-job training and selected study tours, under the guidance of the steering committee.

#### I. **Aquatic/ Fish Expert** (domestic; 2 person-months)

21. **Required Qualifications.** The domestic aquatic/fish expert should have a background in biology or aquatic ecology, be familiar with aquatic (freshwater) biodiversity management theories and practices, and should have worked in aquaculture and fishery.

22. **Description of Responsibilities.** The expert will do the following:
- (i) Assist the team in examining and summarizing the data on fishes and aquatic species in the pilot area watersheds, their biodiversity value, and endangered status.
  - (ii) Collect data on aquaculture and fishery including reservoirs in Viet Nam.

- (iii) Assess and estimate the combined impact of the hydropower projects on aquatic biodiversity in various species, including losses in fish catch or aquaculture by the local residents.
- (iv) Review livelihood programs with enhanced aquaculture in the pilot study area.
- (v) Assist in integrating the results of the public consultation comments into the overall assessment and policy options for aquatic biodiversity conservation.

**J. Terrestrial Biologist** (domestic; 2 person-months)

23. **Required Qualifications.** The domestic terrestrial biologist should have a background in biology, husbandry, or ecology. Actual on-site experience in power projects will be useful.

24. **Description of Responsibilities.** The expert will do the following:

- (i) Assist in examining and summarizing the data on terrestrial species in the pilot area watersheds, their biodiversity value, and endangered status.
- (ii) Collect data on terrestrial wildlife and vegetation in the wetlands and floodplains and in upstream and downstream areas of the pilot watersheds.
- (iii) Assist in assessing and estimating the combined impact of the hydropower projects on terrestrial biodiversity in various species, including losses in the livelihood of indigenous peoples from hunting and catching activities.
- (iv) Review livelihood programs in the pilot study areas that may affect terrestrial biodiversity, and assist in developing a monitoring system and in improving performance indicators to mitigate the effects.
- (v) Integrate the results of the public consultation into the overall assessment to formulate policy recommendation options on biodiversity conservation.

**K. Agricultural/ Irrigation Expert** (domestic; 2 person-months)

25. **Required Qualifications.** The domestic agricultural/irrigation expert should have a background in agriculture or irrigation engineering, and be familiar with agriculture/farming for development projects. Work experience in rural development will be useful.

26. **Description of Responsibilities.** The expert will do the following:

- (i) Assist the team leader in understanding the general trend in agricultural activities and land use patterns in the country and specifically in the pilot study areas.
- (ii) Assess potential changes in water supply and irrigation demand in the pilot study areas resulting from the hydropower projects and other development activities.
- (iii) Estimate the positive and negative impact on agricultural output in the area of higher groundwater levels, lower pumping or collecting costs, and improved capability to undertake gravity-fed irrigation as a result of development.
- (iv) Assess the combined effects of increased water availability and irrigation opportunities, together with anticipated population increase, on land use patterns and livelihood, and provide recommendations to the team policy recommendations.