



Independent Expert Review of the Myitstone Dam EIA

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Disclaimer

The purpose for soliciting expert opinions on the “Environmental Impact Report of Hydropower Development in the Upper Reaches of the Ayeyawady River” was to provide a better understanding of quality of the report prepared by the dam developer, China Power Investment.

The comments provided by the experts can only be considered their personal opinion. Their opinions should not be interpreted as a reflection of the official position of their institutions. The expert opinions are based on the initial reading of relevant sections of the EIA Report to their area of expertise and are limited that that scope. We encourage reviewers to contact the relevant experts for additional information or clarification of their comments.



International Rivers protects rivers and defends the rights of communities that depend on them. With offices in four continents, International Rivers works to stop destructive dams, improve decision-making processes in the water and energy solutions for a just and sustainable world.

ALARM, formally known as ECODEV is a non-governmental social and entrepreneur organization and founded by Myanmar development professionals, intellectuals and

social entrepreneurs since the 1990s. All over Myanmar, ALARM is actively involved in rural development affairs, environmental conservation, advocacy initiatives, and decentralization process. and combating poverty actions together with the support from many partners organizations including local and international organizations as well as some government agencies. ALARM is operating 5 branch offices in different parts of Myanmar and appointed 50 staff covering different races and beliefs.

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Key Findings

A survey of the “Environmental Impact Report of Hydropower Development in the Upper Reaches of the Ayeyawady River” (Report) has found that the Environmental Impact Assessment (EIA) contains some serious deficiencies and flawed conclusions. Based on the reviews from 12 experts in fields including ecology, fisheries, environmental and social impact assessment, public health, flood management and hydrology, the survey found that the analysis of the dams’ impacts on terrestrial fauna was “relatively robust,” but that there were serious flaws in the methodology and structure of the EIA, total neglect of the temporal and spatial scale of the social and environmental impacts of the dams, superficial analysis of the dams’ impacts on freshwater biodiversity, and that public participation failed to meet best practice.

The environmental transformation precipitated by even one or two of proposed dams in the Upper Ayeyawady Cascade would be significant. The impacts of Myitsone Dam alone on riparian communities upstream, within the reservoir inundation areas (already being subject to involuntary resettlement) and for hundreds of miles downstream of the Myitsone Dam, would be considerable. Yet, the Report commissioned by China Power Investment and published in 2011 fails to identify numerous impacts that could reasonably be expected to occur as a result of such large, complex and cascade hydropower scheme. Despite China Power Investment’s commitment to abide by international standards and conduct its work in accordance with the highest standards, seven of the eight expert opinions found that the Report falls well below best practice.

Key Findings

- » The EIA Report considers two cascades of dams. However the comparison presented may have some residual meaning for certain engineering decisions, but **does not help to assess options important to society and biodiversity conservation**. If report would seek to assess different alternative options it would at least consider the impacts and benefits from the several development schemes, such as a cascade on Malikha River alone, a cascade on Namihkva River alone, a cascades on both rivers without Myitsone Dam on Ayeyawady River, as well as a no-project option. Such array of options would give a chance to look for a design where hydropower generation is balanced with the need to compare river biodiversity and well being of Kachin people.
- » The conclusions of the environmental impacts of the dam cascade are based on field surveys that lasted less than a week. **The failure to allocate any more time to field surveys** for such a large area has resulted in major gaps in knowledge and data underlying the primary conclusions on the dam cascade's environmental impacts.
- » The EIA Report reduces the significance of anticipated impacts as if negligible, whereas the resilience or the **adaptation capacity of the environment** or the population is disproportionately emphasized. One of the key functions of an EIA is to predict the capacity of the ecological systems and communities to adapt to the proposed project impacts and whether a gap may arise between the two. There is little or almost no examination of the magnitude of impacts from the dams as compared to the adaptive capacity.
- » On the project-induced **alterations in the river's hydrological regime**, the EIA Report was found to be limited in its empirical scope, and its conclusions unwarranted. The expert reviewer found that the Report seriously underestimated the temporal and spatial scale of the socio-ecological impacts that would be precipitated by the dams' construction. The reviewer recommended a more comprehensive, objective, professional and geographically extensive EIA study over a period of several years be undertaken.
- » The EIA Report understates and fails to recognise a number of project impacts on the **downstream flow and sediment regime** that could be reasonably anticipated from such a massive hydraulic development. According to the expert opinion, it can be anticipated, that the fundamental alteration of both flood and sediment-nutrient flow regimes will have negative impacts on tens of thousands river and wetland-dependent households downstream over a considerable distance, who are not considered in the EIA. Direct impacts that are not examined by the EIA include likely radical changes downstream in the water quality parameters (e.g. temperature, hydrogen sulphide, methane and even dissolved oxygen).
- » The Report **understates the importance of the river's sediment and nutrient regime** and how these might

- be expected to alter over time and the resultant socio-ecological impacts. As the sediment load is to be trapped by the uppermost reservoirs, the river sections and reservoirs below will gradually become devoid of sediment and the water released from the Myitsone Dam at the foot of the cascade, can be anticipated to be rather nutrient-poor, with a strong tendency for increased erosion of sand bars and riverbanks downstream. Further research on how changes in the sediment and nutrient regime might impact downstream areas is needed, since the resultant impacts could prove extremely expensive for society to mitigate. Such changes may lead to alterations in aquatic and terrestrial biota, as well as impacts on bridges and other structures associated with the river channel. Reduced sediment flow may have far-reaching detrimental impacts on downstream agriculture, fisheries and natural ecosystems, with knock-on effects to many sectors of the economy and society. The analysis and conclusions about sediment do not appear to be based on direct field studies or data collection - no specific reference to field studies, data collections or analysis in the material seem to be available.
- » According to the EIA Report, average wet season downstream flows will be diminished and average dry season flows may increase, as Myitsone Dam will be operated primarily for annual base energy production purposes, with possible peaking operations. There is **no discussion however about how the other cascade of dams will be operated, and what impact this might have on Myitsone operations**. Similarly, the EIA appears to assume that no hydropower or reservoir storage development will occur elsewhere in the Ayeyawady River system, so that the flow and sediment characteristics of all other Ayeyawady's tributaries will remain natural and unchanged. This assumption is not justifiable, given the wide variety of hydropower development proposals that are now being considered across the Basin.
 - » The importance of fishing as livelihood and food security has not been examined thoroughly. **The reductive impact of dams on fisheries** can have major impact on the food security and livelihoods of the people. The fish is also depending on the sediments that carry nutrients, and thus there are also other aspects to be considered with hydropower development than only the barrier effect of dams.
 - » The EIA's judgments on the dams' **impacts on freshwater biodiversity** seem to be superficial and based on little information. It is unclear how comprehensive and thorough were the survey methods used to generate the lists of fauna covered under the EIA. The EIA does not seem to take note of primary scientific literature on the impacts of large reservoirs on freshwater biodiversity. The main impacts that are mentioned in the report relate to the transition of water from lotic to lentic conditions. The report tends to assess the impact on freshwater biodiversity as very low or zero due to the conclusion that a loss of habitat for those species that prefer a lotic habitat will be offset by gains in habitat for those species that prefer standing water. There is no reason to assume the biological or physical conditions in a reservoir would be suitable for - for instance - amphibian breeding. Moreover the opposite is more likely to be correct, since the conditions in the created reservoir would certainly not be suitable for amphibian reproduction or larval growth.
 - » The EIA Report tends to reduce the **magnitude of social impacts** and predicts ultimately positive outcomes without offering a roadmap on how to

achieve such results. Resettlement is anticipated to be successful even though no convincing resettlement plan is presented. Perhaps more problematic is that resettlement sites seem to have already been prepared and the project benefits are perceived to be automatically shared by displaced people as well. The limited attention to livelihood impacts is concerning as it would lead to the impoverishment of resettled people. It is largely questionable whether and to what extent diverse stakeholders are involved in the social impact assessment.

- » The EIA Report does not fully address the Myitsone Dam's **impact on local people health** and whether the project will spread certain water related diseases, sexually transmitted diseases, HIV/AIDs, which are common for a dam construction site. Thus, the presence of aquatic weed along the lake and within the tributaries will affect the local human health. An increase in diseases caused by consumption of contaminated raw vegetables and fish (Fasciolopsiasis, Clonorchiasis, Diphyllbothriasis) and by swimming or bathing in contaminated water (Schistosomiasis, Dracunculiasis) is expected. Furthermore, the decline

in shrimp and clam populations caused by degradation of aquatic habitat might trigger the nutrient deficiency in local people's health. Increase of human migration in the dam construction area will result in increase of sexually transmitted disease, HIV/AIDS cases.

- » The EIA Report does not address the project's impact on the local climate. Larger water surface means larger evapotranspiration, higher albedo which reflect more solar radiation back, high saturated area which will lead to higher emission of greenhouse gases, particularly methane. These changes will have impact on regional climate, not solely on local climate. This could be evaluated by using a combination of ecosystem model and field observations.
- » Two of the reviewers had intimate knowledge of the conduct of the EIA, with one reviewer also participating in the field surveys. Based on this, the reviewers note that the EIA Report suffers because field survey data is lacking and because it was collected over a period of less than a week. Many of the expert recommendations and findings were also ignored, and follow-up studies never completed.

Comments on the Myitsone EIA Report were provided by:

1. **Prof. Maung Maung Aye, Myanmar Environment Institute.**
Area of Examination: general overview
2. **Prof. David Dudgeon, University of Hong Kong.**
Area of examination: freshwater animals
3. **Dr. Xiaofeng Xu, Research Fellow, Climate Change Science Institute.**
Area of examination: terrestrial biodiversity, climate change
4. **Dr. David JH Blake, Ubon Ratchatani University.**
Area of examination: environmental impacts of the proposed flow regime (e-flow).
5. **Dr. Darrin Magee, Hobart and William Smith Colleges & Dr. John Gerstle, Gerstle & Co LLC, M.Sc. Aura Salmivaara, Aalto University.**
Area of examination: Myitsone dam's impact on sediment transportation and river delta downstream
6. **Prof. U Nyo Maung, University of Yangon.**
Area of Examination: impact on vegetation
7. **Prof. Philip B Williams, University of California.**
Area of examination: environmental impact mitigation measures.
8. **Dr. Eugene Simonov, NGO Coalition "Rivers without Boundaries"**
Area of examination: comparative analysis of environmental impact of different development schemes
9. **Prof. Thayer Scudder, California Institute of Technology.**
Area of examination: public participation
10. **DPhil Candidate, Narae Choi, University of Oxford.**
Area of examination: Social Impact Assessment (impact on migrants)
11. **Dr. Bandana Pradhan, Institute of Medicine, Tribhuvan University**
Area of examination: Myitsone dam's impact on local people health
12. **Dr. Miguel Countinho, Fernando Leão, Institute of Environment and Development.**
Area of examination: EIA structure

1 Overall Examination of the Environmental Impact Assessment Report

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I would like to make some comments on the “EIA Report of hydro-power development in the Upper Reaches of the Ayeyarwady River” from the view-points of my specialized fields of research interest such as geography, fluvial geomorphology and environmental science.

It is widely known that there are **two** Environmental Impact Assessment (EIA) reports on Hydro-power Development in the Upper Reaches of the Ayeyarwady River. However, nobody knows what and how the *China Power Investment Corporation* (CPI) has stated in their EIA report. The other one was jointly prepared by Myanmar and Chinese experts, and it is known as BANCA Report. (BANCA stands for *Biodiversity And Nature Conservation Association*).

A 945-page preliminary biological assessment of seven planned dams on the Ayeyarwady (formerly known as Irrawaddy), N’Mai and Mali rivers in Kachin State, Myanmar collected baseline information on the biodiversity of flora and fauna in the catchment area of the dams over a period of five months from *January to May 2009*. All expenses of the study were funded by China Power Investment Corporation (CPI). A team of 80 scientists from Myanmar from

BANCA and others from the *Changjiang Institute of Surveying, Planning, Design, and Research* (CISPDR) of China conducted the study.

For BANCA Report, the experts involved did not have enough time for the detailed field survey and collection of empirical data due to many such holidays as Kachin’s Manaw Festival and Chinese New Year Festival. Therefore, total number of days spent for the field survey was less than a week, and accordingly **one cannot expect too much reliability and validity of data and information from this kind of report.**

The EIA Report cannot be regarded as a perfect observation document. Although the survey period needed to take at least about seven months normally, the experts had to conclude the report within five months due to the demands of Chinese experts to cooperate with Myanmar counterparts. **The Myanmar researchers could not have opportunity to read the MoU between the two governments before starting the observation works. As there was no Myanmar Environment Law by then for reference in the country, the facts in EIA Report were compiled from available sources.**

The process of environmental impact assessment cannot be completed within one time. Both direct and indirect impacts have to be observed before and after the project continuously. Based on the observations, the experts will also need to assess and examine

whether the ways of lessening impacts are effective or otherwise.

EIA is a process that should be publicized transparently. Only then there will be no doubt about the project.

There will be both advantages and disadvantages whenever development projects are implemented. Serious disadvantages must be reduced with high degree of lessening plans. Such lessening plans are sometime of great value, while small impacts can be solved easily. Therefore, the responsible persons are suggested to support EIA process from beginning to end.

The Report has placed much emphasis on the negative impacts of damming river on the ecosystem, flora & fauna, biodiversity, natural habitats and environmental conservation of the study area.

Prior to the implementation of a gigantic developmental project in a large drainage or river basin, **many more detailed research projects need to be carried out** by experts, scientists, specialists and professionals from various disciplines taking a sufficient amount of time.

The EIA report should be based on the guidelines and standards of World Bank and the like.

As underlying geology (lithology and structure) plays a very important role in the construction of a dam, a reliable geological map is needed for depicting different types of rock layers and geological structure in details at the dam site, especially in the potential flooded area after the completion of a reservoir.

As this Ayeyarwady Myitsone area has been weak in security for many years, **not many detailed geological surveys have been done so far, and consequently no detailed geological maps and/or data are available.** Based on the existing geological maps published before and after the

independence of Myanmar, the geological conditions of the Myitsone area and its environs are actually not suitable for the construction of large dams and dam-cascade. The area in question is largely composed of **serpentine**, one of the ultramafic igneous rock types, which is durable and resistance to considerable extent. However, when encountered with the water in a reservoir, the serpentine can cause a great danger to the dam.

The dam site lies in the Seismic Zone 4 (i.e. Severe Zone). In other words, this area can experience the earthquakes with the maximum intensity of **Mercalli Scale 8 to 9.** The **active Sagaing Fault is approximately 15 miles away to the west of Myitsone Area.** The engineering structure must be quite resistant to severe earthquakes and ruptures. Those research works and findings of Myanmar geologists should be taken into consideration by the Chinese counterparts, and they in turn should disclose their findings to Myanmar geo-scientists.

The construction of dams on the Ayeyarwady River should be avoided due to the changes in downstream hydrology which may affect navigation, riverine ecosystem and deltaic ecosystem, and will lead to negative impacts on the economy.

The Ayeyarwady dams will threaten biodiversity. Eco-regions which are nationally important, regionally significant and globally outstanding will be directly affected by clearing and logging of the inundation areas and construction activities for a series of dams in Kachin State. Of particular concern are the loss and fragmentation of key ecosystems and the loss of key, endemic and endangered species of both flora and fauna. Definitely there will be negative impacts on potential of availability of traditional medicinal plants. There will be severe negative impacts on regionally significant and globally outstanding three eco-regions, one center of world plant diversity, and severe impacts on

key biodiversity areas and conservation corridors of Myanmar.

Downstream impacts to the whole Ayeyarwady Drainage Basin need to be examined as the river is vital to the country. The Ayeyarwady River is the most important lifeblood river in Myanmar. Millions of people are depending on this mighty river for their livelihoods. It also acts as a conduit of communication to over sixty million of people. The fragmentation of the Ayeyarwady River by a series of dams will have very serious social and environmental problems not only at upstream of dams but also to very far downstream to the coastal delta. A longer and more comprehensive EIA investigation is strongly recommended in such a big and sensitive hydropower development which may give rise to very significant adverse impacts.

The Ayeyarwady dams will have severe negative impacts on livelihoods, public health and safety. On account of construction of a cascade of dams in Kachin State there will be severe negative impacts on livelihoods and habitations of grassroots people of the region, disappearance of some wild rice varieties and their ancestors, disappearance and forever loss of the cultural heartland of Kachin people.

A Social Impact Assessment (SIA) must be conducted and decision makers should balance positive and negative aspects. Proper SIA must be done before construction of each dam to know real impacts on livelihoods. **The main drawback of this EIA Report is the lack of SIA at all. Therefore, systematic SIA must be carried out by competent social scientists.** Before approving the construction, the decision-makers are strongly urged to fairly balance between the negative and positive aspects of dams.

Affected people should be consulted for their consent, and local people are

currently against the projects. The public should be disclosed about the hydropower dams and resettlement programs by having public meetings.

The majority people of local ethnic groups oppose construction of the Ayeyarwady dams especially Myitsone hydropower project. They consider the Ayeyarwady confluence as the cultural heartland of the Kachins. For the longevity of dams to be constructed in Kachin State, the opinion of grassroots people should be brought into due consideration.

The benefits of the project need to be shared equitably. There must be a fair and equitable sharing of benefits coming out from this hydropower development among the stakeholders concerned, including the people of Myanmar in general and Kachin people in particular. **The EIA should be publicly released.** The main audience for this document is the people of Myanmar.

Major salient weaknesses discovered in the EIA Report of Hydro-power Development in the Upper Reaches of the Ayeyarwady River can be summarized as follows:

1. *Downstream impacts, including assessments of river flows, sediment discharge, water levels, flooding patterns, salt water intrusion into the Ayeyarwady Deltaic Region, fish habitats, and riverbank erosion have not been studied yet.*
2. *Baseline data on the Ayeyarwady River Basin as a whole has also not been collected. [Actually, a drainage basin or river basin should be considered as a fundamental geomorphic unit which needs to be thoroughly studied applying the holistic approach and general systems theory.]*
3. *Social, health and economic impacts of the proposed dams have not been addressed yet.*
4. *Consultation with affected peoples*

has not been conducted yet.

5. *Strong conclusions and recommendations that can ensure the concerns raised in the Report are not fully addressed and included.*

In conclusion, water resource management must be based on principles of ecological sustainability and social justice. Affected communities - upstream & downstream - must be protected. To ensure this as well as

transparency and accountability, national reconciliation and genuine democratization is desperately needed in Myanmar. All stakeholders should be urged, if possible, to immediately stop these harmful dam projects in the Ayeyarwady Drainage Basin, and to preserve the river for future generations. And, more importantly the economic, social, health, security and environmental impacts of dams throughout Myanmar must be publicly disclosed from now onward.

2 Freshwater Animals

Prof. David Dudgeon

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Based on those aquatic herpetofauna (reptiles and amphibians) that I have some knowledge of, the report seems remarkably superficial. The main impacts that are mentioned relate to the transition of a formerly flowing water habitat to one that is no longer flowing (i.e. from lotic to lentic conditions) and the authors of the report seem to conclude that the main impact will be a loss of habitat for those species that prefer a lotic habitat (so there are negative scores for certain species) but that this will be offset by gains in habitat for those species that prefer standing water (e.g. a number of amphibians breed in standing waters) so that the overall impact is typically assessed as very low or zero. However, the fact that some amphibians can breed in standing water does not mean that they will reproduce in or even be favoured by the construction of large reservoir. That is because those amphibians breeding in lentic water bodies prefer small, shallow pools or wetlands that are free of fishes since, in many cases, the eggs or larvae are devoured by fish. Reservoirs are neither free of fish, nor are they shallow, and hence there is no reason to assume the biological or physical conditions in a reservoir would be suitable for - for instance - amphibian breeding. Indeed one would expect the opposite is more likely to be correct. There are several reasons for this:

1. Reservoirs contain fishes that eat amphibian eggs and larvae. They are also, typically, sites where exotic species

become established, and this might make predation risk especially high (since the amphibians are not adapted for exposure to such non-native predators).

2. The reservoir will likely be deep and steep-sided: this is certainly not suitable for amphibian reproduction or larval growth; these animals prefer shallow well-oxygenated water with ample light to sustain the growth of algae upon which many larvae feed.
3. Deep reservoirs tend to become stratified, and the lower levels of the water column are often deoxygenated due to the decomposition of inundated terrestrial material as the reservoir fills. In extreme cases, methane may even be generated. This is bad news for fishes, and would give rise to unsuitable conditions for amphibian breeding.

Two other comments:

4. I have no idea what survey methods were used to generate the lists of fauna covered under the EIA. One would want to know how comprehensive and thorough they were. I suspect, but cannot tell, that this EIA report was based on a minimum amount of field work.
5. The judgements reached seem to be superficial and based on remarkably little information, aside from suspected/known distribution of species and some extrapolations based on very general aspects of the biology of particular species (e.g. prefers streams or standing water). The primary scientific literature seems to be virtually ignored.

3 Terrestrial biodiversity, climate change

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As requested by International Rivers, I provide my comments for the Myitsone EIA survey which investigate the potential impacts of the construction of Myitsone Dam in Burma. All review was conducted based on the survey report and some available searchable information from internet. Since I am an ecosystem ecologist, my comments will solely for ecological impact of the Myitsone dam on the local environment, beyond that will be out of my expertise.

Basically, the survey on the impact on terrestrial ecology covers most aspects of the impacts on ecosystem. I am glad to see that the environmental impacts of this huge project are quite small. I would like highlight and add a few more aspects; my detailed comments are:

1. The environmental impacts listed in the report are all direct impact; the indirect impacts are missing. For example, the destroyed habitat for biodiversity, changed water regime on regional climate, even I expected a relative small effect.
2. The report states that the submerged forest land area by reservoirs is only 1.85% of the total area of the evaluated area, and the effects of submerged forest and is limited; this is not very accurate. First, it depends on the area of evaluat-

ed region, and it also the impact is not linearly correlated with the fraction of the region. Some small area might play a fundamentally important role for the entire region. This effect should be evaluated in detailed aspect, for example, the economic or ecological value of the forest land submerged, etc.

3. I expect a relatively small impact on vegetation biomass because the vegetation biomass could be recovered quite easily.
4. The impacts on ecological environment of the lower reaches are far more significant than described.
5. Impact on local climate is not well studied; the larger water surface means larger evapotranspiration, higher albedo which reflect more solar radiation back, high saturated area which will lead to higher emission of greenhouse gases, particularly methane. These changes will have impact on regional climate, not solely on local climate. This could be evaluated by using a combination of ecosystem model and field observations.
6. The statements "increasing of water area in the reservoir area increases humidity of surrounding plants, reduces temperature difference and is beneficial for the growing of plants in the reservoir area" is not robust. Increases in humidify of surrounding plants might not reduce temperature different and it might not be beneficial for the growing of plants in the reservoir area.
7. The stated impacts on terrestrial animals (birds, migration, reptiles etc) are relatively robust.

4 Environmental impacts of the proposed flow regime (environmental flows)

Dr. David JH Blake

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In my opinion this is a rather low quality, sub-standard example of environmental impact assessment reporting for a major hydropower project, which would most likely not pass national standards in many other countries of the world. It is deficient in multiple respects and fails to identify numerous impacts that could reasonably be expected to occur as a result of such a spatially significant, complex and multiple cascade dam hydropower scheme. If permitted, the scheme would involve the construction of seven reservoirs on two major tributaries of the Ayeyawaddy (Irrawaddy) River, the largest of which, the Myitsone Dam would form a reservoir with a surface area of 405 km² and a water storage capacity of 133 billion m³. Each dam in the cascade would form a reservoir that backs up to the next dam upstream, creating stillwater or lacustrine conditions over a distance of approximately 580 kms and surface area of 819 km², where presently there exists ecologically diverse riverine habitats, presently rather minimally disturbed by human activity. Such riverine habitats are relatively rare in the Asian sub-tropics and should deserve a high level of protection. The environmental transformation precipitated by even one or two of these dams being

built would be significant and the impacts on riparian communities upstream, within the reservoir inundation areas (already being subject to involuntary resettlement) and for many hundreds of miles downstream of the Myitsone Dam would be considerable. The seven dams would reportedly store a combined total of 328 billion m³, with the tallest dam (Kaunglanphur) standing 223 m high, and all the other major dams over 128 m high.

The report, as it is written, has a number of shortcomings and deficiencies, which appear to suggest the authors' are primarily interested in serving the interests of the dam developers and not that of objective environmental science or the greater common good. In terms of alterations in the hydrological regime and its impacts on the environment, the report is extremely limited in its empirical scope, and comes to conclusions that appear unwarranted and seriously underestimate the temporal and spatial scale of the socio-ecological impacts that would be precipitated by the dams' construction. The report is remarkably superficial, simplistic and reductionist in its consideration of impacts that could reasonably be expected from such a large-scale infrastructure development project on a biologically diverse river system, including the Nmaiha and Malikha rivers, which combine to form the Ayeyawaddy River just upstream of the proposed Myitsone Dam site. It both understates and fails to recognise a number of project impacts on the downstream flow and sediment regime that could be reasonably anticipated from such a massive hydrau-

lic development. For example, the report states in Section 5.15 "Impact on downstream hydrological regime" (p.151), "Joint operation of the cascade reservoirs will exercise some impact upon the downstream flow, and such impact will come into existence after completion of the reservoirs". Actually, changes in the flow regime (both quality and quantity) will start to be felt starting from the time that construction work begins and the bed of the river is disturbed for structures such as coffer dams or access roads, and will continue throughout the anticipated 8 – 10 year construction and reservoir filling phase (assuming the dams are built in parallel and not one after the other). Many of the environmental impacts will be irreversible and be extremely hard to mitigate for, although mitigation does not seem to be a high priority of the developers, as they believe impacts will be minor.

Similarly, as well as overlooking the likely downstream impacts of several water quality parameters expected to radically change below the dams (e.g. temperature, hydrogen sulphide, methane and even dissolved oxygen¹), the report understates the importance of the equally important sediment and nutrient regime and how these might be expected to alter over time and the resultant socio-ecological impacts. As the incoming sediment load transported from upstream erosion can be anticipated to be largely trapped and settle out in the uppermost reservoirs of the cascade (i.e. the Yen-an and Laza Dams), the river sections and reservoirs below will gradually become devoid of even fine silt and sediment (apart from local point sources) and the water released from the Myitsone Dam at the foot of the cascade, can be anticipated to be rather clear, silt-free,

nutrient-poor and "sediment hungry", with a strong tendency for increased erosion of sand bars and riverbanks downstream until a new geomorphological balance is reached at an indeterminate point downstream. However, the report states (p. 226) that "[O]nly lower reaches near the dam will be affected by erosion". There does not seem to be any factual basis for this conclusion and without further study of this issue, the resultant impacts could prove extremely expensive for society to mitigate for as externalised costs, especially in urban areas such as Myitkyina and other communities that may lose land and infrastructure to increased erosion. The sediments removal in the reservoirs, along with associated nutrients, would also have far-reaching detrimental impacts on downstream agriculture, fisheries and natural ecosystems, with knock-on effects to many sectors of the economy and society, including some of the poorest people. It can be confidently anticipated, based on the experiences and impacts witnessed below other large-scale dams in the Mekong Region and elsewhere in South-east Asia, that the fundamental alteration of both flood and sediment-nutrient flow regimes (the vital "flood pulse") will have negative impacts on many tens of thousands (possibly more) river and wetland-dependent households living downstream over a considerable distance, who are not considered in the present professionally negligent and decidedly unscientific report produced by CPI for the benefit of the developers. A more comprehensive, objective, professional and geographically extensive EIA study over a period of several years is recommended before any decisions are taken about whether to proceed with any of the proposed projects in this potentially destructive scheme.

¹ The report only considers Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), but not the equally important levels of dissolved oxygen (DO) that might be expected in the reservoirs and dam outlets during different seasons.

5 Myitsone dam's impact on sediment transportation and river delta downstream

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After reading the (very short) sediment section, my impression was that it was in general accurate but likely incomplete and inattentive to the specific conditions of that dam in that place on that river. It reads like a general assessment of dam impacts on sediment transport on basically any river, and on those grounds could stand to be much more detailed.

Dr. John Gerstle

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Gerstle & Co LLC
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The general conclusions and comments in the EIA Report regarding impacts to the delta far downstream - that the impact on sedimentation, sediment loads and flows will be small because the proportion of the total catchment area affected/controlled by Myitsone Dam is small compared to the total watershed of the river far downstream at the mouth of Irrawaddy Delta - is reasonable as far as it goes, but can easily be misinterpreted and misunderstood. It is also incomplete because it does not describe the consequences and impacts of changes in flow and sediment load characteristics at various points along the rivers. And such general conclusions require verification with specific data and analysis from specific watersheds and project locations. For example, if the Myitsone

catchment is the source of an unexpectedly large proportion of the total sediment in the Irrawaddy River Basin, the conclusions about impacts of the project on the Irrawaddy Delta could change.

The sections of the Report do not adequately consider the impacts of Myitsone Dam on sections of the river over hundreds of kilometers from Myitsone to the delta, where the impacts of changes in flow and sediment load will be much greater on both absolute and proportional levels. The analysis and conclusions about sediment do not appear to be based on direct field studies or data collection - no specific reference to field studies, data collections or analysis in the material seem to be available.

Because the reservoirs at Myitsone and other points in the cascade will capture much of the sediment from the upstream catchments, there will be significantly altered water flows and diminished sediment flows downstream - leading to concerns about scouring and related alteration of the river channels. These are likely to be of greatest immediate concern in the river reaches near the project. Such changes may lead to alterations in aquatic and terrestrial biota, as well as impacts on bridges and other structures associated with the channel, as well as human practices related to channel and flow characteristics (e.g. recession agriculture and seasonal flood irrigation, fishing etc).

According to the descriptions in the available documents, average wet season downstream flows will be diminished and average dry

season flows may increase as Myitsone will be operated primarily for annual base energy production purposes, with possible peaking operations. There is no discussion, however, about how the other cascade dams will be operated, and what impact this might have on Myitsone Dam's operations. Similarly, the EIA Report appears to assume that no hydropower or reservoir storage development will occur elsewhere in the Irrawaddy River system, so that the flow and sediment characteristics of all other Irrawaddy Basin tributaries will remain natural and unchanged. This assumption is not justified, given the wide variety of hydropower development proposals which have appeared recently.

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In addition to impacts mentioned in the EIA report, hydrological and the sediment impacts will depend on the operational plans of the dams. However, the discussion on

the impacts presented in the EIA has vague founding, there is only one year time series from one hydrological station with information on the sediments. Furthermore the role of sediments for fisheries and agriculture has not been fully discussed. Sediments carry nutrients, which are important for fisheries and for agriculture, and thus, decline in sediment load will have impact on these activities. The role of sediments in the delta dynamics is also not addressed in the EIA. The sediment dynamics near the reservoirs are not described clearly and the linkage between water flow changes and erosion and further the impact on the sediment load are not described in the EIA. The importance of fishing as livelihood and food security has not been examined thoroughly. The reductive impact of dams on fisheries can have major impact on the food security and livelihoods of the people. The fish is also depending on the sediments that carry nutrients, and thus there are also other aspects to be considered with hydropower development than only the barrier effect of dams.

6 Impacts on Vegetation

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I sincerely provide my comments and opinions for “Environmental Impact Report of Hydropower Development in Upper Reaches of Ayeyarwady River”. My review was conducted based on the survey report and my experience as a person who involved in Environmental Impact Assessment (EIA) of hydropower development in upper reaches of Ayeyarwady River. Since I am a botanist and one of the participant in EIA process carried out by BANCA (Biodiversity and Nature Conservation Association Yangon, Myanmar, local counter-part of Chinese experts), my comments will concern with my experiences.

The report was rather bulky but not robust. There are serious flaws and underestimates in impact identification and analysis. The environment impacts listed in the report are all direct impacts but indirect impacts are missing. Also the impacts identified are only for the construction periods and the operational period impacts are also missing. For example, the impact study was carried out only in the inundated area which caused by the construction of dam. Actually the indirect impact zone was beyond this area.

The significance analysis of impact results seems to be pre-determined imaginations. For example, in table 4.2.1, the comprehensive identification result of “Regional and National Culture” is. This means that the impact was positive as well as negative, low, irreversible, long-termed and only in the assessment area. In addition its conclusion was

not logical. For example, actually Myitsone area is the “Cultural heritage of Myanmar” as well as “Heart Land” of Kachin people. Kachin people believe that Myitsone is the birth-place of their civilization and it is also their sacred site like Jerusalem of Christian and Macca of Musalin. The permanent loss of such place should not be allowed by any mean. Similarly the result of impact analysis on landscape and tourism is also funny. This shows that they gave same value to the natural landscape vs. man-made landscape. Actually the eco-tourists may not use their money to see man-made landscape.

Again the downstream impact assessment was not carried out yet. It also fails to analyze a number of impacts on downstream flow and periodical flooding which produce fertile agricultural land around the downstream of river by nutrient sedimentation. As one of the persons who carried out Biodiversity Impact Assessment, I had pointed out that “The long-term potential impact of dam on large river like Ayeyarwady”, may cause the down river hydrological changes which can destroy riparian ecosystem dependent on periodic natural flooding (formation of fertile soil deposition so called “Maye nu kyun”), exacerbate water pollution during low flow period and increase salt water intrusion near river mouth (destroy the delta ecosystem) if storage in dam is significantly huge.

So I had recommended that:

“The construction of dam on the large river such as Ayeyarwady should be avoided due to the changes in downriver hydrology which may affect the navigation, riverine ecosystem and delta ecosystem. This will lead to nega-

tive impact on the economy of people dwelling in riparian along Ayeyarwady River.”

However my proposal was ignored as our separate report named “EIA report on Hydropower development of Ayeyarwady River Basin Above Myitkyina” by BANCA (Biodiversity and Nature Conservation Association Yangon, Myanmar), had been totally neglected.

The vegetation study was not completed. The studying on the vegetation of catchment areas of Maykha and Malikha Rivers was missing. The forests in the catchment areas are the life-supporters of the river. Table 3.3.3 “List of vegetation in evaluated area” is much generalized. Also, the Regional Vegetation Map was lacking. Fig 3.3.1 “Diagram of vertical distribution of vegetation type in evaluated area” was also superficial. It could not be a representative of the individual area of seven cascades dam intended to build on Maykha and Malikha and Myitsone.

The forecast and assessment of social impacts (Pg. 205 to 212) is also superficial and predetermined imaginaries. As an examples;

1. “The hydropower development on the upper reaches of Ayeyarwady River will not affect the living habitat of the migrants significantly.”
2. “Since the hydropower stations have a long construction period, with a great number of workers, it can offer employment opportunities to the migrants and local residents.”
3. “The hydropower development at upper reach of Ayeyarwady River will also promote the economic and social development for the whole drainage basin, Kachin State, even in the whole Myanmar.”

— and so on. What a serious flaw it is?

The public opinions and suggestions (on pg. 272) are also based on the leading questionnaires. The study on two types of questions (in Myanmar language in Annex.3) is the leading questions. Both are multiple-choice types. Such question organized by government authorities and the interview in the presence of local authorities will not be a true opinion since at that time Myanmar was under the rules of military dictatorship.

7 Comparative analysis of environmental impact of different development schemes

Dr. Eugene Simonov

International Coordinator
NGO Coalition “Rivers without Boundaries”

Two cascades compared with each other practically do not differ in their detrimental environmental and social consequences. The comparison presented may have some residual meaning for certain engineering decisions, but does not help to assess options important to society and biodiversity conservation.

If report would seek to assess different alternative options it would at least consider the impacts and benefits from the following schemes:

- » cascade on Malikha River alone;
- » cascade on Namihkva River alone;
- » cascades on both rivers without Myitsone Dam on Ayeyawady River - any one of two almost identical schemes presented;
- » no project option.

Such array of options would give a chance to look for a design where hydropower generation is balanced with the need to compare river biodiversity and well-being of Kachin people.

The assessment presented in the report gives us no such an opportunity beyond general understanding that Myitsone dam itself is responsible for disproportionately large share of impacts. We can indirectly learn that from “example” of single hydrodam impact presented at the end of the study.

Two “schemes” presented a fine and relatively common example of “greedy hydropower development” when engineers try to utilize high percentage of hydropower potential (let us say >30%) and thus jeopardize and neglect all other values of natural river ecosystem. Less destructive options are possible only if smaller share of hydropower potential is utilized leaving room for retaining of important ecological services on some of major tributaries and in the mainstem.

The document also is very contradictory, because it refers to “a lot of room for wild species” in other downstream sections of river basin, but also refers to extensive plans of hydropower development in this river basin. Therefore assessment report does not take into consideration impacts of other hydropower schemes proposed for the other portions Ayeyawady River basin. However any responsible analysis of the subject should assess proposed hydropower development basin-wide to see how much ecological functions and intact ecosystems could be preserved in different development conditions.

8 Environmental impact mitigation measures

Prof. Philip B Williams

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For my field of hydrology and geomorphology it is completely inadequate for two reasons. These impacts - although mentioned in a general sort of way in other sections are not discussed in this section. Also most of these impacts are irreversible and not mitigatable.

9 Public participation

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practice” approach for achieving two way public participation in the hydro planning process. Second, the questionnaires were answered during the truce and before warfare began again in June 2011. Though recent statements on both sides between the government and the Kachin authorities indicate the possibility of another truce, 20 months of warfare make the 2009 questionnaires irrelevant for current planning purposes.

The 2009 Public Participation section is unacceptable for two major reasons. First, a series of public questionnaires is not “a best

10 Social Impact Assessment (impact on migrants)

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Summary of the review

The Social Impact Assessment of the Myit-sone Hydropower Project requires a significant improvement in terms of data substantiation, the rigour and the depth of assessment and the presentation of balanced and comprehensive views, so as to function as a technical document based on which decisions about the project can be made. Whilst lacking a robust examination of data, the current assessment tends to reduce the magnitude of social impacts and predicts ultimately positive outcomes without offering a roadmap to achieve such results. Likewise, resettlement is anticipated to be successful even though no convincing plan is presented (more problematically, resettlement sites seem to have already been prepared) and project benefits are perceived to be automatically shared by displaced people as well. The limited attention to livelihood impacts is concerning as it would lead to the impoverishment of resettled people. In sum, it is largely questionable whether and to what extent diverse stakeholders are involved in the social impact assessment.

Comments on the Social Impact Assessment

Impact assessment – unsubstantiated and overly optimistic

The statements of impact assessment are almost unanimously projecting optimistic

views that a given problem is “not serious” and can be addressed (“somehow”), without presenting evidence supporting such assessment: e.g. “The amount of waste is not large” (241). Even when a potential problem is predicted, no sophisticated suggestions are made for dealing with it, apart from a statement that the issue should be addressed “properly.”

E.g. “The waste will have adverse impact on public health and landscape in resettlement area if without any proper disposal.” (242) – No further elaboration on ‘proper’ disposal ensues.

The combination of the two, that is, an optimistic projection of social impact that is unsubstantiated by detailed analyses or mitigation measures is such that the report contains many contradictions starting with “A will have some impacts on B” only to conclude with “A will not affect B.”

E.g. “Domestic sewage of the resettlement area will affect the water environment of the nearby lateral ditch, but as compared to the runoff of the Ayeyawady River, the discharge of the domestic sewage of the area is tinier. The discharge of domestic sewage will not affect the water quality...” (241)

E.g. “The production and living of residents will damage the existing vegetation and cause some animals to loss [sic] habitat. However, resettlement area of the affected residents is located in the region where human activities are concentrated. The existing wild animals are less [sic], and most of them are small animals such as snakes, rats and birds. These animals

have strong adaptation to new habitats. Thus the resettlement of affected residents will not directly affect the animals.” (242-243)

These paragraphs illustrate the predominant style of argument in the report whereby the significance of anticipated impacts is reduced as if negligible (e.g. “less”, “little”, “small animals”), whereas the resilience or the adaptation capacity of the environment or the population is disproportionately emphasised. For example:

E.g. “For migrants settled behind in situ, the production and living styles after settlement vary little against the former one. They can adapt to local production and living styles quickly. The hydropower development on the upper reaches of the Ayeyawady River will not affect their living habits significantly.” (205)

E.g. “The environment capacity of land is relatively large, and influence of resettlement on the land bearing capacities is small, which will not impact the residents’ production and living in the settlement area.” (206)

Promises than planning

There is little or almost no examination of the magnitude of impact as compared to the adaptive capacity whereas an impact assessment is commissioned for predicting whether a gap may arise between the two (i.e. impacts and adaptive capacities). Consequently, the report fails to provide convincing mitigation measures for addressing such gaps, leaving the possibility unattended whereby the project may generate myriad adverse impacts on the environment and existing settlers. The limitation is most pronounced in its forecast of impact on migrants’ living styles (Section 6.1 (1)) where concerns for the weak adaptation capacity of the aged, women and other vulnerable groups are expressed and the long-term adaptive cycle is acknowledged but

only to reach an abstract conclusion that “But on a long term basis, traditional plantation conditions before and after the settlement are not changed fundamentally” (205). There is no analysis regarding the process of adaptation, short- and medium-term challenges, and how the long-term equilibrium can be reached.

The same applies to the discussion of resettlement. To begin with, the internationally recognised resettlement standard is acknowledged in the report: “The living standard of the affected residents shall be restored to the original level and improved further” (239). The assessment also makes a few important points regarding resettlement such as maintaining the existing socio-cultural fabric and tradition, moving residents by villages and reconstructing key religious and cultural institutions such as churches and Pagoda. The importance of incorporating third parties such as non-governmental organisations in survey, planning and assessment is also noted.

However, discussions of practical methods to achieve the stated goals are very limited. It is suggested that resettlement sites will be located in the region with good road transport conditions and large land environmental capacity (e.g. along the road from Myitkyina to Myit-sone) (239). Without further data on how such large and cultivable land has been left empty and how it is to be distributed and used, a promise is made that “After relocation, production and living conditions will be guaranteed and living standard of the affected residents will be improved” (239).

Expectation than examination

In addition to rather optimistic assessment of adverse impacts and unplanned promises of positive resettlement outcomes, there are many wishful statements in the report that potential benefits from the hydropower project will accrue to project affected people. As an illustration, a statement below anticipates

an economic ‘boom’ in the region that would benefit affected people (i.e. ‘migrants’):

E.g. “[...] some of migrants can find laboring opportunities in the hydropower development, which plays an active role in improving living standard and adapting life styles” (205).

Existing researches present mixed outcomes regarding the extent to which the influx of construction workers generate employment opportunities² and the overall picture is generally quite far from what the assessment predicts to be the case that the project would promote catering industry, service industry, culture and entertainment, and traffic and transportation. Furthermore, there are well-known risks of having a number of ‘outsiders’ migrating into the region such as the potential of new diseases or socio-cultural norms to be introduced.

More broadly, a missing link between the costs and the benefits of a project has long been pointed out and subsequently, an equitable distribution of project effects has been the most contentious and critical issue pertaining to development-induced displacement since displaced/resettled people have not necessarily been beneficiaries of a project. The issue of *accessibility* and *accountability* needs to be discussed for a wider share of project benefits by raising questions such as: who can access the anticipated benefits and how? Who is in charge of ensuring that promised benefits are delivered?

Without a rigorous examination of project benefits and an actual discussion of their distribution, the report presents abstract, macro statements such as: (a) the construction of Myitsone Hydropower station will

promote economic and social development in Myitkyina City; (b) the level of medical treatment and cultural education will be improved considerably; and (c) hence the hydropower project will benefit medical treatment, culture and education of the affected residents because they will be relocated close to the City (243). No convincing links are made between these statements apart from an implicit assumption that the project will create broad (but unknown) socio-economic benefits, which hopefully may also be shared by project affected people by a simple factor of physical proximity to the City.

Key limitations/missing points

In addition to the shortfalls detailed above, a few fundamental limitations are found that jeopardise the quality and the purpose of the social impact assessment. First, if an assessment is conducted for scoping out anticipated social impacts of the hydropower project, how can there already be a prepared resettlement site with newly built houses (see page 240)? Other parts of the report also suggest that resettlement sites may already exist (e.g. “In resettlement area, the vegetation ... has been disturbed by people” (242)). This seems to indicate the possibility that the project would proceed or was already on-going regardless of the social impact assessment outcome, which undermines the whole purpose of conducting such assessment.

Second, the report is predominantly concerned with the impact of resettlement on the environment (although important in itself) as compared to socio-economic and cultural issues surrounding resettlement. For instance, it is not clear to what extent the social implication of an environmental change was explored or whether the inherent intercon-

nectivity between the two was recognised. Likewise, the lack of attention for the livelihood impacts is one of the biggest gaps in the report. This makes the reviewer/reader of the report wonder whether social impact assessment was conducted by a trained specialist (or it was carried out by engineers or environmental impact assessment specialists). Without intending to draw an unnecessary divide between different expert groups, I still argue that population displacement and resettlement is such complex and controversial an issue that it is critical to have an experienced specialist(s) together with others.

A minor point regarding terminology is the use of ‘migrants’ for people who are forcefully removed from their homes and communities. In a rather rigorous academic term, ‘migrants’ refer to those whose movement is more voluntary than forced in nature. Thus, using migrants in this context can be confusing, if not inappropriate, since there can also be ‘migrants’ in the region such as migrant workers moving between provinces and cities. That existing residents are to be displaced by the project should not be disguised and the report needs to be more specific in whom it refers to and call them displaced people or resettlers.

Comments on the Table of Contents

This is a brief comment on the table of contents, which works more as a checklist rather than as a critique of actual contents.

No mitigation measures for social impact

The table of contents does not contain a section that presents a resettlement and reconstruction plan or any recommendations in

this regard; whereas the Section 7 is dedicated to ‘environmental impact mitigation measures’. As already mentioned, social impact assessment in fact does not provide much input in this regard, whereas, oddly enough, it appears that resettlement sites and houses are already prepared for people to be displaced.

Public participation (Section 10)

For social impact assessment, the views and voices of people to be affected are crucial and public participation needs to be facilitated maximally and in the most appropriate way. Based on the outline of the Section 10, below questions can be raised to examine the extent and the quality of public participation for the EIA.

- » What does the questionnaire explore? Does it include questions or provide information about displacement (and resettlement)?
- » Were any other more participatory methods than a survey used?
- » Who were the stakeholders included in the survey? How were the “subjects” defined (by what criteria? Who was included and who was excluded)?
- » Does the survey include a range of potentially affected people and broader stakeholders such as civil society organisations and local government officials?
- » What was said by people regarding the environmental and social changes that they anticipate or experience?

² See research on the Lesotho Highlands Water Project (Ryan Hoover, 2001, International Rivers) or research on Three Gorges Dam (e.g. Brook Wilmsen et al., 2011, Environment and Development 20(4))

11 Myitsone dam's impacts on local people health

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In water related diseases, waterborne and vector borne diseases are already mentioned in the EIA Report. But other water related diseases and STD, HIV/AIDs which are common for a dam construction site are listed here. They are:

1. Water related

- » Prevalence of diseases due to consumption of contaminated raw vegetables and fish will increase (Fasciolopsiasis, Clonorchiasis, Diphyllbothriasis).
- » The presence of aquatic weed along the lake and within the tributaries will affect the local human health. The weeds provide the necessary habitat for black-fly, mosquitoes and snails, which are the vectors of water-borne illnesses such as bilharzia, river blindness and malaria.
- » Additionally, the degradation of aquatic habitat might result in the decline of shrimp and clam populations. The nutrient deficiency in local people's health will be from the loss of shellfish populations, as they provided an essential source of dietary protein. Likewise, the rural and industrial economies will experience the financial losses associated with the decimation of river aquaculture.
- » Water based diseases caused by swimming or bathing in contaminated water like Schistosomiasis and Dracunculiasis will increase.

2. STD and HIV/AIDs

- » Dam construction attracts a large number of migrant workers from different areas. There is enough global evidence on the vulnerability of construction workers to HIV/AIDs.
- » The people in construction site are characterized by high mobility, isolation and working in confined environments. They are often very young adults in sexually active age group but without an adequate access to health services. A significant proportion of workers are migrants and prone to HIV infection.
- » Increase of human migration in the dam construction area will increase the chance of increasing STD (sexually transmitted disease), HIV/AIDs.
- » Commercial sex workers will increase in the resettlement area
- » Mothers to child transmission of HIV/AID will increase in such areas

Preventive measures

- » Water sanitation awareness program to prevent water born, water washed and water based and vector borne diseases.
- » Appropriate interventions such as toilet coverage, water coverage, water quality maintenance
- » It has been compulsory to provide periodic awareness program of HIV/AIDs to all the worker of any big construction work is being performed (ILO 2008).

12 EIA structure

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After a Review of the EIA of the Myitsone dam planned for the Ayeyawady river in Burma we've got the following comments:

- » the analyzed EIA concerns the "hydropower development in the upper reaches of Ayeyawady river" and includes the assessment of 2 layout alternatives (5 or 7 dams).
- » the document is well structured. The EIA content is organized in natural, ecological and social environments.
- » nevertheless the content of the study is not sufficiently detailed and not adapted to the complexity of the project. The EIA pretends to assess 2 layout alternatives for the hydropower development: 5 or 7 dams. Information included in the EIA is insufficient, non-technic. In many components there isn't enough technical information to allow a correct assessment of impacts and identification of the adequate mitigation measures.
- » to have an adequate assessment the EIA should describe in detail and separately

impacts caused by each one of the 7 dams.

- » chapter 1.5 describes the objectives of environmental protection. One of the aims of the EIA should be to check if this objectives are fulfilled: this is not done.
- » page 140 shows an impact matrix that pretends to be very objective. There isn't any information in the text that supports the objectiveness of the matrix. The matrix should be shown as a synthesis of the study and not the other way around.
- » the text is biased: positive impacts are overemphasized and negative impacts are underemphasized.
- » the EIA should include the assessment of this project in climate change from both mitigation and adaptation perspective. What are the emissions of greenhouse gases caused by flooding 660 km² of forest? Is this project resilient to climate changes estimated for the region?
- » Flooding of the rivers causes severe impacts on the systems provided by ecosystems from which some local populations depend: EIA should mention and assess these impacts.

From my perspective this EIA would not be approved in the European Union context for lack of background information and subsequent analysis.

“The Social Impact Assessment of the Myitsone Hydropower Project requires a significant improvement.”

*Narae Choi, DPhil Candidate,
University of Oxford*

*Dr. David JH Blake,
Ubon Ratchatani University,
Thailand*

“The environmental transformation precipitated by even one or two of these dams being built would be significant and the impacts on riparian communities upstream, within the reservoir inundation areas (already being subject to involuntary resettlement) and for many hundreds of miles downstream of the Myitsone Dam would be considerable.”

“Most of these impacts are irreversible and not mitigatable.”

*Prof. Philip B Williams,
Beatrix Farrand Distinguished Visiting Professor,
University of California, Berkeley*

*Professor Maung Maung Aye,
Patron & Chief Advisor,
Myanmar Environment Institute
(MEI)*

“The Ayeyarwady dams will threaten biodiversity. Eco-regions which are nationally important, regionally significant and globally outstanding will be directly affected by clearing and logging of the inundation areas and construction activities for a series of dams in Kachin State.”