Rainforest Protectors of Sri Lanka

http://www.RainforestProtectors.org
RainforestProtectors@Gmail.com
65 - 1/1 Hotel Road, Mt. Lavinia
Tel: 0773486568

February 9, 2019

To: Hon. Ravi Karunanayake,

Minister of Power & Energy

Hon. President Maithripala Sirisena

Hon. Prime Minister Ranil Wickramasinghe

Mini-Hydro Projects – Negligible Amount of Energy at the Expense of Massive Ecological Destruction, Social Issues and Loss of Tourism Income

The recent explosion of mini-hydro projects in the environmentally sensitive and bio-diversity hotspot wet-zone of Sri Lanka has resulted in many ecological and social issues along with severe impact to tourism thus costing the country vital foreign exchange. These projects have already destroyed more than 1,000 kms of rivers and stream ecosystems. They do not provide a solution to the energy crisis due to inability generating power during droughts resulting in abrupt power shortages and the need to buy expensive diesel power (e.g. March - June 2017 where the plant factor of all hydro plants was ~8%). Contrary to the perception, mini-hydro is more expensive than solar and wind projects due to its low plant factor and with climate change this is absolutely no solution for the future. Therefore, further to the meeting at your office on January 11, 2019 and the 2 files we handed over with relevant information on environmental, social, economical and legal issues related to mini-hydro projects in Sri Lanka, we wish to follow-up with the comprehensive information below along with options for producing year-round ecologically sustainable renewable energy.

1. Capacity and contribution of mini-hydro projects to the National Grid

An estimated 145 mini-hydro projects are currently active and approval for another 73 projects have already been given. The capacity of mini-hydro projects range from 0.1 MW to 10 MW, however, approximately 50% of the projects are 1 MW or below. According to Sustainable Energy Authority, economically feasible small hydro potential in Sri Lanka is estimated to be 400 MW. Current total installed power generation capacity of the country is approximately 4,050 MW, consisting of 900 MW of coal power, 1,335 MW of oil burning thermal power, 1,375 MW of hydro power and 442 MW of non-conventional renewable energy sources such as wind, mini hydro, biomass and solar power plants[1]. The targeted total installed power generation by 2025 is 6,400 MW[1]. Therefore, the maximum viable contribution by mini-hydro sector to the National Grid by 2025 will be 6.25% or less. With climate change expected to hit Sri Lanka very hard in the coming years, it is highly likely that most mini-hydro projects will end up operating far below their capacity, further reducing their share of energy contributed to the national grid.

2. Ecological impact of mini-hydro projects

While historically mini-hydro was promoted by the Government as clean renewable energy, the reality has been quite the contrary. Almost all mini-hydro projects are constructed in ecologically sensitive areas wet zone, containing rich biodiversity. These areas contain nearly all of the endemic flora and about 75% of the endemic fauna found in Sri Lanka. The streams, rivers and waterfalls targeted for mini-hydro projects contain many endemic species, often found only in the project site and surrounding area. During an islandwide freshwater survey, researchers from the Wildlife Conservation Society of Galle (WCSG) found Fairy Dandiya *(Rasboroides nigromarginata)* in one of the streams after an absence of 53 years at the proposed Athwelthota mini-hydro project[2]. However, with mini-hydro construction, most stream stretches have become dead zones due to blocking and diversion of water. Stream water level has direct impact on the breeding patterns of endemic fish species such as Barred Danio *(Devario Pathirana)* and Side Striped Barb

(Systomus pleurotaenia). Most species of fish and crustaceans found in these streams have evolved over millions of years to live in specific conditions found only in these habitat. These species quickly die off due to sudden change in the environment and lack of sufficient water eventually resulting in a total ecological collapse.

Barred Danio (Devario Pathirana)

Side Striped Barb (Systomus pleurotaenia)

Once native species are taken out of the ecosystem, invasive species quickly gain hold creating further damage. Within several mini-hydro project sites such as Rambuka in Kalawana Divisional Secretariat Ratnapura District, pools of stagnant water were observed as a result of damming the stream and diversion of water. These pools were devoid of native fish species and ideal conditions have been created for breeding mosquitoes and the threat of a massive epidemic.

Many western countries including the U.S.A have already realized the ecological damage caused by hydro-power dams built decades ago and are gradually demolishing them to ensure free-flow of river water essential for species such as salmon that swim hundreds of kilometers upstream to lay eggs[3]. Due to construction of dams, salmon runs have been blocked resulting in a total collapse of the species which affect the whole ecosystem including humans.

3. Impact to Rainforests and catchment areas due to mini-hydro projects

Mini-hydro projects also take a heavy toll on the surrounding rainforests. In many mini-hydro project sites such as Koskulana and Kosgulana mini-hydros in Sinharaja buffer zone, Eli Hatha (Naya Ganga) mini-hydro project in Sri Pada sanctuary and Anda Dola mini-hydro project in Dellawa Rainforest, ancient primary rainforests were cleared to make way for access roads, forebay tanks, powerhouse and penstock stretching for many kilometers. Endemic critically endangered rainforest canopy trees such as Hora *(Dipterocarpus zeylanicus)*, Thiniya Dun *(Shorea trapezifolia)*, Yakahalu *(Shorea dyeri)* have been cut down by the hundreds in forest reserves belonging to both Forest Conservation Department and Divisional Secretaries, to make way for construction and sometimes for profit. While felling of trees and construction activities within protected forest reserves is illegal, destruction within the buffer zone of World Heritage Sinharaja Rainforest is threatening the very survival of this most important ecosystem and national treasure.

Destruction along the border of Sinharaja World Heritage Rainforest due to Koskulana Mini-Hydro Project

4. Loss of groundwater due to hydro projects

Groundwater is a crucial part of the ecosystem and for agriculture and human consumption. Loss of groundwater can have severe consequences to the villages and the entire country. Unfortunately, reports of significant loss of groundwater has been reported at many mini-hydro project sites. Residential wells in Makuluella and underground springs in Heel Oya have all dried up due to Uma-Oya hydro project. Residents of Bandarawela have complained that once lush green and beautiful village is becoming like Hambantota and Trincomalee. There isn't a drop of water in the wells and streams[5].

5. Soil erosion and landslides due to mini-hydro projects

Since construction activities for mini-hydro involve clearing stream beds of their vegetation and excavation in mountain slopes, heavy soil erosion and landslides have been reported in many areas threatening the environment and villagers. These incidents have been disastrous for the surrounding community who are dependent on forestry and agriculture for their living. Sedimentation has also destroyed many streams and rivers.

Excavation of mountain slopes and landslides in Anda Dola mini-hydro project site

6. Impact to agriculture, tourism and other sectors due to mini-hydro projects

Mini-Hydro projects also bring in their share of economic issues to the country. Due to Deegalahinna mini-hydro project in Nuwara Eliya District, more than 300 acres of paddy fields around one kilometre of Deegal Oya have gone dry due to the obstruction of water supply[7]. In addition to losses in agricultural sector due to loss of water for traditional farmers, tourism sector is severely affected due to the destruction of many scenic natural sites that are popular among eco-tourists. Popular waterfalls such as Ethamala Ella in Matara District, Eli Hatha in Kegalle District, Athwelthota waterfall in Kalutara District are threatened by mini-hydro development. Some of these waterfalls, such as the magnificent Eli Hatha (cascading 7 waterfalls) have become just a trickle of water released from a pipe. The lost tourism revenue is immeasurable as both current and future tourism potential are impacted.

Eli Hatha (7 waterfalls), waterfall #1 and #2 have become just a trickle due to diversion to mini-hydro plant

7. Issues with approval process of mini-hydro projects

The Initial Environmental Examination (IEE) process conducted during mini-hydro projects itself is highly controversial. These reports are being prepared by the project proponent. Obviously the project developer cannot be trusted to highlight the environmental issues which may cause issues getting their project approved. Further, the IEE process does not allow for public comments unlike the EIA process. Therefore, an environmental disaster is only evident when the project is started. It is also widely known that certain project approving officers especially at Central Environmental Authority have accepted bribes from project developers. The former Kegalle/Ratnapura District CEA officer (now transferred to Kandy) Mr. Priyantha Welikannage who has been appointed as a political favor during the previous regime even has a court case against him questioning his qualifications for the post (Supreme Court - Case number : S.C.F /02-291/2012). Unfortunately, many ecologically destructive mini-hydro projects including one in Sinharaja buffer zone (Koskulana mini-hydro project) has been approved by him with complete disregard to the environmental impact on UNESCO World Heritage Rainforest and going to the extent of defending the developer even when evidence of massive destruction were produced before him.

8. Issues with enforcement of conditions by approving agencies

Due to lack of continuous monitoring and enforcement, even the conditions laid out by approving agencies have been violated by many mini-hydro development companies. The recommended environmental water flow is not released downstream and instead the plants divert and consume almost all water of the stream[8]. Even construction has happened violating approval conditions issued by Government authorities. At Anda Dola mini-hydro project a weir of 2.8m height has been constructed instead of 1.5m violating condition A.5 laid out by Forest Conservation Department in its approval letter.

9. Alternative Ecologically Sustainable Options for Generating Power

9.1. Rooftop Solar Power

Solar power generation has come a long-way since its beginnings and currently becoming very competitive form of renewable energy. Solar power can be generated through several methods and the most common and environmentally friendly option is through Photovoltaic (PV) panels. PV panels can be installed in rooftops as well as in solar farms. Solar farms are attractive options for countries with vast open areas of land such as the Middle East, Australia and North America. But for an island nation and a biodiversity hotspot such as Sri Lanka with limited land resources, it is not a viable option. Rooftop solar projects on the other hand reuse existing rooftops of government and private office buildings, factories and residential homes. They do not have any negative ecological impacts, can be easily installed in a relatively short period of time. Excess power from rooftop solar panels can be fed back to the national grid. Rooftop solar projects also offer the benefit of being able to install off grid in rural areas as demonstrated in countries such as Bangladesh[9] making rooftop solar projects best suited for Sri Lanka.

While the Government of Sri Lanka has not provided any incentive to promote rooftop solar projects until recently, several private companies have successfully carried out their own projects within their factories and office buildings. MAS Holdings completed a 1 MW rooftop solar project at their Thulhiriya fabric park[8]. Hatton National Bank followed up with a 1.3 MW rooftop solar project that will power the landmark HNB Towers in Colombo, 249 HNB customer centres islandwide and seven branches operating solely on solar power[9].

2. Waste-to-Energy

Mountains of unhealthy landfills in several major cities such as Colombo, Kandy, Galle and Ratnapura are already causing major environmental and health issues to the surrounding community. However, the technology is already available to address the solid waste issues while generating electricity to the national grid. “Plasma Gasification” is most suitable as it breaks down solid waste into the basic elements with no harmful gases released in the process. Plasma gasification can be used to convert carbon-containing materials to synthesis gas that can be used to generate power and other useful products, such as transportation fuels.

Plasma gasification provides key benefits:

* It unlocks the greatest amount of energy from waste

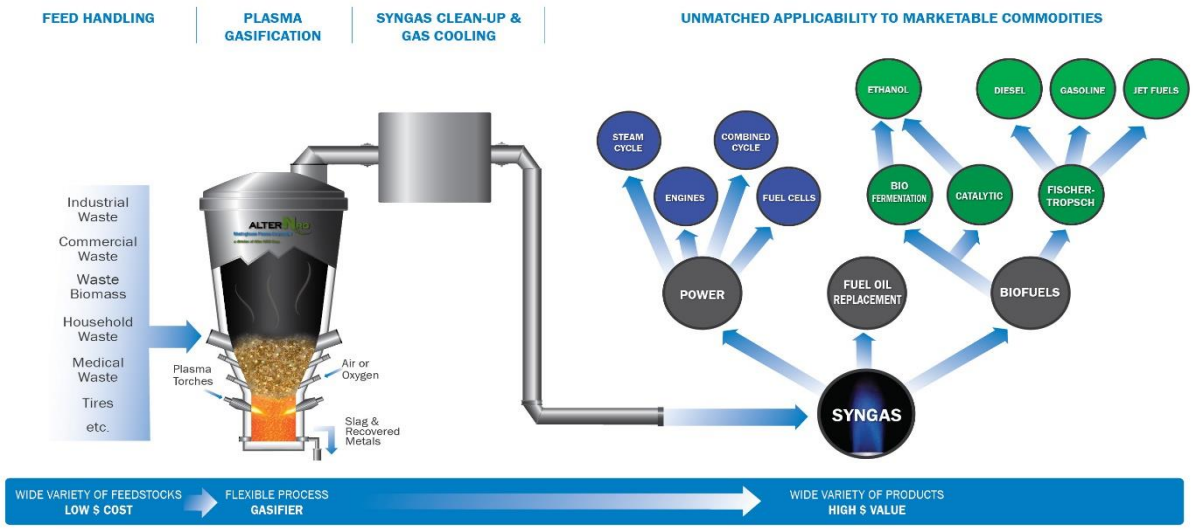
* Feedstocks can be mixed, such as municipal solid waste, biomass, hazardous waste, and auto shredder waste

* It does not generate methane, a potent greenhouse gas

* It is not incineration and therefore doesn't produce leachable bottom ash or fly ash

* It reduces the need for landfilling of waste

* It produces syngas, which can be combusted in a gas turbine or reciprocating to produce electricity or further processed into chemicals, fertilizers, or transportation fuels



Unfortunately, proposals submitted by companies to UDA in 2015 for Waste-to-Energy projects on a build-own-operate basis have not been approved by relevant authorities yet. The same authorities resorting to dumping Colombo's massive solid waste dumps in Aruwakkalu situated in the Wilpattu National Park buffer zone instead.

3. Wave Energy

As an island nation, Sri Lanka has a large potential to generate energy via untapped ocean waves . Waves are consistent throughout the day and thus electricity production is predictable and overall it can be planned and properly managed. This makes wave energy more consistent than wind and solar energy. Locally, research into wave energy is done at University of Moratuwa with promising results. National Aquatic Resources Agency (NARA) has already identified many sites suitable for wave energy projects.

Power plants can be Float or Buoy Systems that use the rise and fall of ocean swells to drive hydraulic pumps. The object can be mounted to a floating raft or to a device fixed on the ocean bed. A series of anchored buoys rise and fall with the wave. The movement is used to run an electrical generator to produce electricity which is then transmitted ashore by underwater power cables.

India has estimated that the potential for wave energy along its 6,000 km of coast is about 40,000 MW. While Sri Lanka has still not estimated its wave energy potential to our knowledge, using the estimates done by India, our 1,340 km coast could potentially generate approximately 9,000 MW which is more than twice the total installed power generation capacity as of 2018.

4. Wind Energy

Wind Energy is gradually becoming a popular renewable energy option. From an environmental perspective, the main concern with wind energy is the deadly bird strikes which can devastate populations of bird species if the projects are built within bird migration routes. Therefore, careful planning needs to be done when selecting suitable sites for wind power projects. Recent technological advances, especially bladeless turbines should also be considered for future wind energy projects.

The alternative ecologically sustainable renewable energy options suggested above are all practical with many currently connected to the national grid or in construction. Our neighboring countries with much larger population and energy needs such as India has far surpassed Sri Lanka in this regard.

10. Conclusion and recommendations

Sri Lanka is considered as one of 18 biodiversity hotspots in the world, meaning our country has very high biodiversity but under severe threat due to unsustainable development. Construction of mini-hydro projects have resulted in further loss of biodiversity. It is not sustainable as the ecological collapse directly affects water flow thus significantly reducing future power generation capacity. Ironically, Sustainable Energy Authority still promotes these ecologically destructive mini-hydro projects as #1 "sustainable energy" and has even sent personal threatening letters to divisional and district level authorities to ensure environmental and social considerations will not be heard and to obtain approvals despite public protests.

Therefore, the relevant authorities need to immediately set a clear policy and vision towards sustainable energy generation in Sri Lanka. Let's not sacrifice our rich natural heritage including waterfalls, streams, rivers and rainforests to generate a paltry, less than 6% energy to the national grid that cannot be generated when electricity is needed most during dry season. Instead, promote ecologically sustainable rooftop solar, waste-to-energy, wave-energy and offshore wind projects which can produce energy throughout the year instead of having to enforce power cuts annually due to ever increasing drought periods. We are open to further discuss any questions or concerns you may have and thank you for your attention to this matter. We look forward to you and the Government taking necessary steps as outlined in a timely manner to guide the country and the energy policy in the right direction.

Thank you

Mr. Sriyantha Perera

President, Rainforest Protectors of Sri Lanka

Copies:

(1) Director General, Central Environmental Authority
(2) Conservator General, Forest Conservation Department
(3) Director General, Irrigation Department
(4) Director General, Department of Wildlife Conservation
(5) Chairman, National Economic Council
(6) Director, Presidential Task Force for Environment Conservation

Appendix

1. "Energy Empowered Nation 2015 – 2025" by Ministry of Power and Energy

   http://powermin.gov.lk/sinhala/wp-content/uploads/2015/03/ENERGY_EMPOWERED_NATION_2015_2025.pdf

2. Fairy Dandiya swims back from oblivion

   http://www.sundaytimes.lk/100815/Plus/plus_16.html

3. Largest dam removal aims to bring salmon back

   http://www.nbcnews.com/id/44554709/ns/us_news-environment/t/largest-dam-removal-aims-bring-salmon-back/

4. Sylvan spot threatened by dam proposal

   http://www.sundaytimes.lk/150301/news/sylvan-spot-threatened-by-dam-proposal-138289.html

5. Is the country's water resource under threat due to large scale human activity in the central hills?

   http://newsfirst.lk/english/2016/08/news-1st-special-report-sri-lankas-water-resource-threat/144296

6. Hydro power plant threatens bio diversity

   http://ceylontoday.lk/64-114634-news-detail-hydro-power-plant-threatens-bio-diversity.html

7. Call to protect environment from mini-hydro power projects

   http://dailynews.lk/?q=2016%2F07%2F30%2Flocal%2F89011

8. MAS unveils country's largest rooftop solar plant in fabric park

   http://www.dailymirror.lk/94197/mas-unveils-country-s-largest-rooftop-solar-plant-in-fabric-park

9. HNB invests in solar power to reduce carbon footprint

   http://www.dailymirror.lk/106386/HNB-invests-in-solar-power-to-reduce-carbon-footprint

10. WEPRO to build Sea Wave Energy based Power Plant in Sri Lanka

    https://techtime.news/2015/08/26/werpo/

11. WEPRO gets approval for 10 MW wave project in Sri Lanka

    https://renewablesnow.com/news/werpo-gets-approval-for-10-mw-wave-project-in-sri-lanka-484073/

12. Finnish firm to produce alternative energy from sea waves

    http://www.dailynews.lk/2017/11/17/business/134785/finnish-firm-produce-alternative-energy-sea-waves

13. Finland company to help Lanka produce Wave Energy

    http://www.dailynews.lk/2017/10/11/local/130920/finland-company-help-lanka-produce-wave-energy

14. Seabased makes Sri Lanka Wave Energy Deal

    https://marineenergy.biz/2018/04/27/seabased-makes-sri-lanka-wave-energy-deal/

15. Electricity from Sea Waves Soon

    http://powermin.gov.lk/english/?p=4570