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“Filling gaps and removing traps  
for sustainable resource management”

## Renewable Energy Development in Southeast Asia: A Review on Trade-Offs with Environment and Nature Conservation

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### Abstract

Southeast Asian countries are rich in renewable energy resources, including hydro, wind, solar, geothermal and bio-energy (biomass, bio-fuel, and bio-gas). Blessed with this enormous potential, countries try to fulfil the energy security and climate change mitigation targets by promoting renewable energy development. This paper reviewed several studies showing that there are numerous trade-offs between renewable energy development and environment and nature conservation. The most frequently reported trade-off is coming from hydro power development in Cambodia, Lao PDR, Vietnam, Myanmar, and Malaysia. The construction of dams producing hydroelectric power results in land use change and habitat loss, effecting biodiversity and often water quality. Another important trade-off is caused by bio-energy, for example by the expansion of oil palm plantations which are reported as the main reason of deforestation and wildlife extinction in Indonesia. Trade-offs further include the possibility to emit greenhouse gasses and air pollution which contrasts with the climate change mitigation action. Another trade-off occurs in geothermal power development, which decreases soil and water quality, resulting in landslide and soil erosion in Indonesia. There were no studies found about trade-offs related to wind power, likely because there is not so much wind power development yet in Southeast Asia.

Reflecting on the existing impacts, it is clear that renewable energy is not always sustainable. Limited financial resources make advanced technology and infrastructure unaffordable, resulting in poor quality of equipment and facilities, damaging the environment. These trade-offs also have further implications for social and economic aspects, especially for livelihood near the project areas. Further scientific research and evaluation will be needed to better understand impacts and find ways of balancing the trade-offs in an optimal way.

Lack of appropriate policies and regulation considering the environmental impact of the project can also trigger environmental damage. Government commitment and intervention will be vital to drive the industry in a sustainable manner and cause less negative impacts to environment and nature. A good policy formulation with strong implementation in the field can achieve sustainable renewable energy development without harming the environment.

**Keywords:** Environment, nature conservation, renewable energy, Southeast Asia, trade-offs