

# Perspectives.

Issue No. 31

## The Impacts on the Community of the Proposed Coal Plant in Lamu:

Who, if Anyone, Benefits from  
Burning Fossil Fuels?

By DeCOALonize



# The Impacts on the Community of the Proposed Coal Plant in Lamu:

## Who, if anyone, benefits from Burning Fossil Fuels?

In 2013, the Government of Kenya proposed the construction of a 1,050-megawatt coal plant in Lamu County. It would be the first coal-fired generation plant in Kenya, and the first in East Africa. The proposal for a coal plant was curious because Kenya has more than enough current capacity and potential for renewable energy generation to not only meet current electricity demands, but also to meet and exceed the projected demands through 2030.

The proposed coal plant in Lamu not only tells the story of a growing economy turning to an outdated environmentally destructive means of energy production, but also illustrates the plight of indigenous peoples and local communities, and the threat to their land, livelihoods and culture from unnecessary industrial development.

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Cover photo: Lamu Island, © Save Lamu



Lamu Children, © Save Lamu

# Lamu

Lamu is a county located on the northern coast of Kenya, boasting one of the most beautiful coastlines in the world. The Lamu Archipelago is made up of dozens of islands. The largest are Lamu, Manda and Pate. Lamu was once the most important trading centre in all of East Africa and is home to the Swahili people who still follow, in many ways, the same lifestyle as their ancestors in the fourteenth century.

The Swahili are a group of people who speak Kiswahili as their mother tongue. They are Muslims and inhabit the coast from Somalia in the north to Mozambique in the south. In Lamu, they make their livelihoods primarily through fishing, using traditional dhow boats to traverse the bay. They also depend on the fish they catch to feed themselves and their families. The Swahili in Lamu are intimately entwined with their marine ecosystem, relying on the mangroves that line their shores for wood for their dhows, architecture and elaborately

carved furniture, and on coral and lime for the walls of their buildings and houses.

As the oldest and best-preserved Swahili settlement in East Africa, the United Nations Scientific and Cultural Organization (UNESCO) declared Lamu a World Heritage Site in 2001. This designation spawned another economy in Lamu: tourism. Each year tens of thousands of people come to Lamu to explore the labyrinthian streets and wander among the donkeys, craftsmen building their wares, and people selling fish in the square in front of the early nineteenth-century fort. The many cultural festivals celebrated on the island also attract thousands of tourists.

Yet the Swahili people and their environment are under threat: first, from the Lamu Port-South Sudan-Ethiopia-Transport (LAPSSET) corridor, which includes a new port in Lamu, and a proposed oil pipeline and depot, industrial park and transport hub comprised of an international

airport, a railway line and highway network, and a metropolis and resort city; and, more recently, the proposed coal-fired electricity generating plant.

In 2014, a Heritage Impact Assessment, prepared by George Abungu, Karel A. Bakker and Ishanlosen Odiaua, highlighted the threats to the heritage site from the LAPSSET project. The authors found that “the EIA [Environmental Impact Assessment] came to a positive recommendation for the project, despite not understanding the cultural resource and therefore having no basis for assessing impact and designing mitigation”.

The proposed Lamu Coal Power Plant will exponentially increase the already significant risks posed by LAPSSET to the health and livelihoods of the people in the region, the ecosystem, and to Lamu Old Town World Heritage Property.



Traditional Dancers, Lamu Cultural Festival (Ngoma), © Save Lamu



Donkey, Lamu Town, © Save Lamu

# Background to the Coal Power Plant

Historically, Kenya has generated its electricity from a combination of hydroelectric and diesel power plants. More recently, renewable resources such as geothermal, wind and solar energy have entered the country's electricity generation portfolio, with 24 per cent of Kenya's electricity coming from these sources in 2015. The idea for a coal plant was first introduced in the 2005 20-year Least Cost Power Development Plan (LCPDP) commissioned by the Government. The plans for a 150MW coal plant to be constructed at Dongo Kundu near Mombasa were dropped in 2008 when the LCPDP proposed a 2x150MW coal plant instead. The Government had by then decided to build the plant in Kilifi and initiated a feasibility report, but faced opposition from the community, particularly around land acquisition. The Government therefore moved the location to Lamu, which appeared to be an ideal site as plans for the LAPSET corridor were already in place. In addition, the multiplicity of ethnic groups in Lamu, of which the Swahili are only one, meant

that there would be less political cohesion to oppose the plan. In early 2014, the Government invited tenders, and the contract for the Lamu Coal Plant was awarded to Amu Power Company in September of that year.

Amu Power is a special purpose joint venture between Gulf Energy, a petroleum company, and Centum, an investment company dual-listed on the Nairobi Securities Exchange and the Ugandan Securities Exchange. The entity's sole project, the Lamu Coal Plant, is to be designed and built by Power China. The plant will be owned by the Kenyan Government and the electricity generated will be delivered by state utility, Kenya Power. The electricity from the plant is slated for transmission on the National Grid, and taxpayers will pay an additional USD 270 million for the transmission line.

In order to fuel the plant, Amu Power plans to import coal primarily from South Africa and Mozambique. The Government has plans to mine coal for the plant in nearby Kitui, Kenya, but

this development will take an additional six years to get online and requires the construction of a railway from Kitui to Kwasasi to transport the coal.

The plans for this plant not only go against the recent trend in international divestment from coal and coal-fired generation, but also ignore the fact that the plant is not necessary to meet current or projected electricity demand. Historically, the growth rate for electricity use in Kenya has hovered around 6 per cent. Lahmeyer International, an independent engineering consultancy that prepared the Power Generation and Transmission Master Plan for Kenya's Ministry of Energy and Petroleum, projects electricity consumption in Kenya to grow, on average, by 8 per cent annually through 2030, with a peak load in 2030 of 4,700MW. The plans for the Lamu Plant were adopted based on an anomalous projected demand growth of 15 per cent and a peak demand in 2030 of 10,000-15,000MW.



Mangroves, Lamu County, © Sara Duboys

# Burning Coal

Coal combustion requires large quantities of coal and water to feed and cool the plant during operations, and creates waste in the form of air emissions, effluents and ash.

**Inputs:** The Lamu Coal Plant is intending to use coal primarily from South Africa and, when the mine in Kitui is developed, will also source some of its coal from Kenya. Coal raises environmental and health concerns throughout its life cycle: from mining to transport, storage and combustion. During the first three stages, coal dust is a major contaminant. Inhaling coal dust can cause lung inflammation, increased risk of cardiopulmonary disease, chronic obstructive pulmonary disease, hypertension, lung disease and kidney disease. In addition to the risks to human health, in Lamu the dust would coat the mangroves, reducing their ability to exchange carbon dioxide and harm marine organisms.

In order to maintain a safe temperature for the plant, millions of litres of water are required for cooling. Although the plant is located on Manda Bay, which leads into the Indian Ocean, pulling water for a plant in this area poses significant risk to the water resources of the nation. As noted in Kenya's LAPSSET Corridor Infrastructure Development Plan "[w]ater demand will largely outstrip supply by 2030" and the water sources used to support LAPSSET – which includes the port located in the same region as the Lamu Plant – "are projected to experience huge deficits in water supply".

**Outputs:** The release most commonly associated with coal plants is the smoke coming out of the stacks. The emissions from coal plants include carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), mercury (Hg) and particulate matter.

Depending on the emission controls installed, they can also release differing quantities of lead, uranium, carbon monoxide, volatile organic compounds, cadmium, and other heavy metals. Breathing air containing these emissions is linked to asthma, cancer, ear and lung problems, and neurological diseases.

These emissions call into question Kenya's ability to keep its commitment to the United Nations Framework Convention on Climate Change. In its Intended Nationally Defined Contribution, Kenya committed to reduce its greenhouse gas emissions by 30 per cent based on Business As Usual. In 2010, Kenya's greenhouse gas emissions were 73 million tons of carbon dioxide (CO<sub>2</sub>). The proposed coal plant would release 8.8 million tons of CO<sub>2</sub>e annually, which would double its emissions from the energy sector and increase Kenya's national emissions by 6-10 per cent.

The water output from coal combustion is primarily the release of cooling water. When coal is burned to generate electricity, the boilers heat up and need to be cooled with water. This requires millions of gallons of water each day which, while cooling the plant, are heated and released back into the source. The coal plant's Environmental and Social Impact Assessment Study (ESIA) states that at the discharge point, the temperature of the water will be 9 degrees centigrade higher than the ambient temperatures. This increase of 6 degrees over the World Bank Group Environmental Health and Safety Guidelines for Thermal Power Plants would cause coral bleaching – the breaking down of the relationship between the coral and the algae that live in it – and, if high temperatures persist for two months, the coral will begin

to die and will no longer be able to sustain itself or the aquatic creatures that live in the reef.

The ash residue from coal combustion contains toxic elements including mercury, cadmium, lead, naturally occurring radioactive materials, and over a dozen heavy metals. Exposure to these elements causes heart damage, lung disease, reproductive problems, birth defects and cancer. The Lamu Coal Plant proposes an ash yard that will hold 26,740,000 cubic metres of ash and stand 25.8 metres high at a mere 200 metres from the intertidal zone. The ESIA identifies the site of the Lamu Plant as "high flood risk and vulnerable" and states that "flows are likely to cause flooding, water logging and inundation of the floodplains of some of the watersheds of Lamu Coal Power Plant project Kwasasi area".

Lauri Myllyvirta, an energy and pollution analyst and Clifford Chuwah, an environmental consultant, found that "the planned Lamu coal-fired power plant is more likely to result in approximately 27 (present day) and 43 (2030) premature deaths per year due to exposure to PM2.5 [particulate matter with a diameter of 2.5 micrometres and less] and NO<sub>2</sub> [Nitrogen Dioxide] including deaths of infants due to an increased risk of respiratory infections" and that "assuming a 40-year lifetime, and applying the projected health impacts for 2030, the proposed power plant would be responsible for a total of 1,600 premature deaths (95 per cent confidence interval: 1,000-2,200) and 800 low birth weight births over its entire operating life".

# Impact



Sea Turtles Hatching, © Save Lamu

The lives, livelihoods and culture of the Swahili and other peoples of Lamu are interwoven with their environment. It is impossible to discuss the impacts of coal combustion on the environment without also talking about the impacts on the community. Community members are concerned about how the plant will affect their lives and if there are any ways their environment, health and livelihoods could be protected if Amu Power goes ahead with the plant.

## Environment

As seen above, the coal plant will have significant impacts on the environment of Lamu. This will begin, according to James Kairo, a Marine Ecologist and Chief Scientist with Kenya Marine and Fisheries Institute, during construction. He found that “the sediment build-up during the construction phase of the project would disrupt stability and lead to a potential collapse of the marine ecosystem. The death

of mangroves and associated ecosystems would further lead to a release of 1000tCO<sub>2</sub> per hectare of mangrove lost; from both above and below ground components.”

Mohammed Mbwana, a resident of Lamu and Chair of the Shungwaya Welfare Association, a community-based organization that provides civic education on land and natural resource rights, noted that the mangroves “make up the largest mangrove forest in Kenya, [and] are very important as they protect

sea grasses and coral reefs from various destructions such as pollution. As regards humans, they act as a barrier from strong monsoon winds and currents as well as a sink for diseases which may emanate from the ocean.”

The mangroves and the bay are also home to a variety of fish and migratory birds, sea turtles and the dugong – considered a vulnerable species. Each of these species will be affected by the increased temperature of the water as well as the release of metals and other compounds into the ecosystem. The beaches adjacent to the mangroves are an important nesting site for sea turtles – also considered vulnerable by the International Union for Conservation of Nature and Natural Resources. The region also houses endangered species such as the triton shell, sea horse and shiny lobster.

Thus, any destruction of the mangroves, beaches, or water systems would have irreparable impacts on their habitat and threaten their existence.

Furthermore, within marine ecosystems, the aquatic life is adapted to specific ranges of water temperature. When the temperature changes, it affects rates of reproduction and interspecies interaction, including the potential extinction of species that others rely on for food, thereby disrupting the entire ecosystem.

For endangered species, the survival of some animals may depend on whether their offspring can safely migrate from protected breeding areas to other areas where they are safe from fishing and capture. In warmer waters, like those in and around Lamu County, dispersal distances tend to be shorter, so marine protected areas may need to be closer together than in colder waters.

During the operation of the coal plant, the emissions will cause acid rain. Acid rain can ruin water

systems and crops, plants and trees, and affect fish and wildlife. As noted in the ESIA, there are two national parks and numerous critical land and marine habitats in the zones identified as most affected by emissions from the plant. Myllyvirta and Chuwah found that "total acid deposition on land is projected at 8,000 tonnes SO<sub>2</sub> equivalent, of which 24 per cent or 2,000 tonnes into critical and legally protected areas".



Drying Fish, Lamu, © Michel Laplace-Toulouse



Fishing trap, © Save Lamu



Fishermen, Lamu County, © Michel Laplace-Toulouse

## Livelihood and culture

Destruction of the environment has a direct impact on the local economy and the economic sustainability of the Swahili people.

The nitrogen in acid rain kills fish and shellfish. This will significantly reduce potential incomes for fishermen and the fishing industry in the region, which is valued at KSh 1.5 billion. The fishermen who fish near the proposed plant use artisanal vessels and equipment; the traditional fishing practices and boats are best suited to these sheltered and restricted areas.

In assessing the impact of the coal plant on the local fishermen and fishing industry, the Department of Fisheries Livestock and Cooperative Development found that the approximately 5,500 fishermen near the plant site would face the greatest impact. The marine water pollution from the plant will lead to the loss of fishing ground, nursery and feeding grounds, and the disappearance of priority species, "resulting in loss of livelihoods".

Acid rain also changes the chemistry of soil, reducing the nutrient content and damaging

the roots of plants and trees, thereby diminishing agricultural production. It also affects the health of trees, leaving them more vulnerable to environmental stresses and disease. In Kwasasi, the same area as the proposed coal plant, farmers grow cashews, coconut, millet and sesame. Their health, land and livelihoods will be most impacted by the emissions but, because they are being compensated for their land, they are not raising any concerns about the plant. Compensation is set at KSh 800,000 per acre (USD 8,000) with a cap of KSh 800 million.

Mohamed Athman Bakar, a resident of Lamu and the Chair of Amu Island Water Resource Users Association – a group working with fishermen to conserve water in Lamu County – is also concerned that in addition to the farmers, the mangrove cutters and fishermen of Kwasasi “who rely on the creek around that area for prawns and lobsters will be highly impacted by the proposed coal project”. Currently, fishermen in Lamu earn approximately KSh 200 million (USD 2 million) from crabs and KSh 450 million (USD 4.5 million) from lobsters – both of which would be in endangered not only from the loss of mangrove habitat but also with increasing acidification of the waters.

Destruction of the mangroves and the coral reef will also mean that the Swahili people no longer have access to the materials required for their traditional arts and architecture. The Swahili are known for their wood carvings and beautiful furniture – all carved from mangroves.

Mr. Bwana explains: “Mangrove cutters rely on different species of mangrove trees to make dhows, build houses and also sell charcoal from it.” The clearcutting of mangroves to build the plant – which would cut down all species indiscriminately – in addition to the damage during operations from acid rain, and heated and contaminated waterways, will have an impact on all types of artisans as well as women who use the charcoal to cook food for their families.

The walls of traditional Swahili buildings are made of coral stone, coral rag and lime (which is made from burning coral stone over mangroves and leaving it to mature) and then covered with plaster. As the coral dies off with rising water temperatures, these types of building materials will also become scarce, resulting in a cessation of traditional construction and historical architectural practices.

In addition, the emissions from the coal plant will cause corrosion and other damage to the historic

buildings and structures, and create haze pollution that limits visibility. The obfuscation of the stunning vistas of Lamu Town and the neighbouring communities and islands, in conjunction with the elevated toxicity in the waters that would destroy the coral reefs, could deter both locals and tourists from swimming and snorkelling off Lamu’s once pristine beaches. This would have a significant effect on tourism, thereby hitting the local economy from yet another angle. Tourism brings more than KSh 2 billion (USD 20 million) into the economy of Lamu each year and contributes more than KSh 500 million in taxes (USD 5 million).

### Health

Releases from coal combustion plants – in the form of gases, liquids and solids – have been proven to damage human health. In the case of the Lamu Coal Plant, air “emission limits applied to the project are alarmingly weak in international comparison. For example, the plant would be allowed to emit 5-10 times as



Simsim (Sesame) Farm, Kwasasi. © Omar Elmawi





Fundi Carving a Chair, © Save Lamu



Carved Door with Traditional Motifs, © Save Lamu

much key air pollutants as a new coal-fired power plants in China and the EU." "Approximately 460,000 people live in areas where air quality would be notably affected, while approximately 1,000 people live in the areas of highest impact." The particulates in air emissions are known to cause asthma, bronchitis, cardiac disease and cancer. In addition to the pollution, inhaling acidic fog or misty air can be damaging to human health as the particulate matter causes asthma and headaches, and irritates the nose, throat and eyes. It is particularly dangerous for people who are old, sick or have chronic respiratory problems.

The ash contains materials that are carcinogenic and radioactive. The ash would be deposited in an ash pond on the shore of Manda Bay, posing a health risk to all the people and animals who reside in the vicinity. According to an independent analysis, the "total fly ash deposition on land is predicted at 500 tons per year, of which 22 per cent or 110 tons into critical and legally protected areas".

An analysis of the ash from 41 South African coal samples found 500 tons of ash could yield 3-10 kg of arsenic, 50-130 kg of chromium, 20-40 kg of copper, 80-270 kg of manganese, 20-90 kg of nickel and 7-40 kg of lead.

The designated ash yard at Manda Bay will be built over a freshwater aquifer, which poses a significant health risk to anyone using nearby ground or surface water for drinking, washing, agriculture or aquaculture. Coal ash contains toxic elements including arsenic, mercury, cadmium, lead, naturally occurring radioactive materials, and over a dozen heavy metals. Exposure to these elements causes heart damage, lung disease, reproductive problems, neurological effects, birth defects and cancer. And as pollution controls are added to smokestacks to reduce air emissions, the compounds that are collected end up in the ash making it increasingly toxic. According to the ESIA, the ash pond for the Lamu Plant is designed to store ash for 15 years but the plant is expected

to be in use for 50 years. There is no proposal for how the ash will be stored beyond the first 15 years. This is a significant health risk because, around the world, ash ponds have leached toxic compounds into the ground and water. The toxins in coal ash "have the potential to injure all of the major organ systems, damage physical health and development, and even contribute to mortality". This is a particular risk to all of the residents and visitors to Lamu because, as noted, the designated pond for the Lamu Coal Plant will be built in a flood zone.

# In conclusion

Based on the evidence, it is inconceivable that the proposed coal plant in Lamu would not cause irreparable damage to the natural environment in Lamu County. Furthermore, it is impossible to separate the significant impact on the environment from the impact on the lives and culture of the Swahili people because they are so interdependent.

There is no convincing argument of the need for the plant given the consensus on projected electricity demand and the abundance of renewable energy resources in Kenya. We question why this project is moving forward given the impact it will have on our lives and are doing everything within our power to try to stop it.



**About the author:** This report was written collectively by members of deCOALonize. DeCOALonize is a collaboration of environmental and social justice advocates who want Kenya to have a green economy powered by sustainable and clean renewable energy. Partners consist of individuals and organizations from Kenya, South Africa, Australia, Europe and the United States of America. For additional information, visit [www.deCOALonize.org](http://www.deCOALonize.org)



Dhows at Sunset, Manda Bay, © Save Lamu

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