



# **Harnessing Wind Energy for Climate Change Adaptation and Food Security in Coastal Regions of Ghana: A Policy Perspective**

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The African Technology Policy Studies Network (ATPS) is a multi-disciplinary network of researchers, private sector actors and policy makers promoting the generation, dissemination, use and mastery of science, technology and innovation (ST&I) for African development, environmental sustainability and global inclusion. ATPS intends to achieve its mandate through research, capacity building and training, science communication/dissemination and sensitization, participatory multi-stakeholder dialogue, knowledge brokerage, and policy advocacy.



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## Introduction

Agriculture is the mainstay of the economies of many rural coastal communities in Ghana. Due to changing climatic conditions, the economy of these communities is experiencing low productivities that in turn lower their living standards. Poor and erratic rainfall patterns, high incidence of pest and disease outbreaks, severe and prolonged droughts, among others, have led to persistent crop failure making agricultural practice less attractive to the youth. In other words, agricultural practice is left to the poor and older generation, who are becoming increasingly vulnerable to the effects of climate change as their livelihood is gradually being eroded. To curb the tides of diminishing economic fortunes, rapid rural-urban migration and build climate change adaptation resilience there is a need to address the distinct climatic needs of these coastal communities so as to speed up their adaptation innovations and behavioral changes.

From a local context, natural resources within these communities must be identified and harnessed effectively and efficiently to stimulate and speed up processes of climate change adaptation and to address the constraints to adaptation. This policy paper therefore presents critical climate change adaptation issues confronting coastal communities in Ghana, and provides recommendations for the effective exploitation of wind energy resource potentials in the region to support and push the drive for climate change adaptation processes.

The estimated gross wind electric potential for Ghana is about 5,600MW or 5.6GW. The areas of moderate to good resource areas account for 4.0GW of electric. Over 60% of this potential is spread along the coastal areas, a region that also has good infrastructure such as roads, transmission network and bulk load centers.

## Impacts of Climate Change Effects on Coastal Communities

Table 1 summarizes the impacts of climate change on agriculture among communities living along the coastal region of Ghana.

**Table 1: Climate Change effect on agriculture along the coastal areas of Ghana**

<b>Climate change effects</b>	<b>Observed/experienced impacts on agriculture</b>
Poor rainfall, severe drought and excessive rainfall	Poor crop development, decreased yields; increased insect pest outbreaks, delayed planting time in some communities. Crops badly affected include cassava, maize and indigenous vegetables. Other areas are fishing activities and livestock production
Rising temperatures	Bushfires leading to crops and livestock destruction, poor soil fertility, low yield and periodic crop failures.
Heavy precipitation /Floods	Damage to crops; soil erosion; inability to cultivate land due to water logging of soils, destruction of crops, loss of biodiversity
Strong winds	Abortion of flowers and dropping of fruits and complete dislodging of plants
Severe Drought	Land degradation and soil erosion; lower yields from crop damage and failure; increased livestock deaths; increased risk of wildfire; loss of arable land.
Sea levels increase	Salting of irrigation water, estuaries and freshwater systems; loss of arable land and increase in alternative livelihoods

Source: TMT Energy/ATPS survey compilation 2010.

These observed impacts have direct effect on livelihoods and food security especially for the under privileged due largely to the following constraints.

- > High cost of production as a result of escalating input prices vis-a-vis high quantity required,
- > Price instability from over/under-supply of certain crops, post harvest losses which aggravate poverty and health risks associated with agro-chemical applications.
- > Lack of availability and accessibility of organic manure on relatively large farms.
- > Technologies incompatibility as farmers are unable to apply some introduced technologies effectively and efficiently.
- > High cost of irrigation facilities and energy make it extremely difficult for farmers to utilize the downstream water resources to improve agriculture production.
- > High incidence of crop failure and farmers inability to scale up indigenous innovations and technologies.

In the midst of these constraints, the following critical questions are frequently asked:



1. How can natural resources be harnessed or exploited for integrated climate change adaptation for coastal communities?
2. How can climate change adaptation policies be localized to better influence agronomic practices and behavioral change in building adaptation resilience?
3. Can local farmers adapt to climate change through diversifications?
4. Can wind power be used to improve irrigation practices and present more sustainable livelihood opportunities?

The development of the wind energy potential in these coastal communities would obviously trigger opportunities, prosperity and growth. Apart from the establishment of commercial wind parks in these areas, it would also lead to the emergence of green industries and creation of thousands of jobs for the people. The trickle-down effect will be the emergence of a vibrant agricultural industry. Developing holistic adaptation policies and localizing them can largely influence behavior and speed up climate change adaptation. For instance, an integrated renewable energy and environmental policies for climate change adaptation can lead to an integrated wind farm and agricultural innovations in coastal communities. The wind energy during idle moments could be channeled to support productive applications mainly mass irrigation of uplands or farmlands. An integrated policy strategy would ensure easy diversification of economic activities and the stimulation of vibrant and sustainable agricultural industrialization. Farmers can therefore grow more and other crops using available energy to create induced climatic conditions such as irrigation in place of over reliance on rain-fed agriculture.

## Conclusion and Summary of Recommendations

Perceived effects of climate change have brought about a number of emerging indigenous innovations and technologies for adaptation in the coastal regions of Ghana. However, these innovations have not been adequately linked with other essential requirements to speed up the process of climate change adaptation. Some of these essential requirements include the provision of adequate irrigation facilities, improving the agronomic practices, increasing tractor services, supply of adequate and reliable energy services, and provision of drought tolerant agro-inputs, among others.

Coherent policy strategies are vital to creating climate change adaptation structures that can stimulate and speed up resilience. The development of the renewable energy resources is in line with the government of Ghana's policy objective to achieve 10% contribution of modern renewable energy in the total national electricity generation mix by 2020.

This sector policy boost offer limitless opportunities to harness resources to stimulate the development of agricultural potential as well as to also diversify the local economy of coastal communities to integrate better climate change adaptation processes.

### **Policy Recommendations**

- > Wind resource is site specific; hence, the areas identified as hotspots should be delineated and reserved purposely for wind energy development.
- > Coherent policies should be developed to create the necessary framework for integrated energy and agricultural promotion along coastal communities of Ghana.
- > Strong institutional support and coordination to address these issues are required for behavioral changes and enhanced climate change adaptation.
- > Efficient interfacing between policy, research and target communities through regular dialogue and institutional support required.





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