

Sector	Coastal Zone and Low-Lying Communities
Sub-sector/Category	Flood Control
Technology	Energy efficient mobile pumps for flood control
Scale of Application	Coastal Zone
Availability	Mobile pumps for flood control has been introduced in Guyana and is used mainly to alleviate flood. However, it is also used for irrigation during extremely dry conditions. The capacities and model of the pumps differ depending on the quantity of discharge required. Due to the high fuel costs and the shift towards cleaner technologies, energy efficient pumps are recommended. The use of clean energy and more efficient motors for pumping solutions is already in the global market place, for example, Grundfos, a US based company is a major supplier providing pumping solutions in India.

Technology Characteristics

Introduction

Climate Change and variability will result in extreme weather conditions, from excessive high intensity rainfall and flooding to protracted droughts, which would have catastrophic effects on agriculture and livelihood (SNC, 2012). These climatic events will place additional stress on flood control and the country's drainage network.

Guyana's drainage system is natural, gravity flow, augmented by pumps and depends on the main rivers, which extend beyond the coast. Between 1988 and 2010, flood events resulted in more than \$634m in economic damage affecting up to 42% of the population. In January 2005 alone, catastrophic floods in the coastal zone affected 25% of the population resulting in a near breach of the East Demerara Water Conservancy dam. The effects included total economic losses equivalent to 60% of GDP for that year. Flood hazard risks are further exacerbated as a result of CC and climate variability trends. According to the SNC, 2012, the recent flooding events "demonstrates Guyana's vulnerability to climate driven events and its short-comings in the current drainage infrastructure which is insufficient to discharge excess water from heavy rainfall".



Hydra Flow Mobile pump used in Guyana

Discharge Capacity - Cusec	Number of Pumps
15	1
20	2
40	16
80	5
120	9

Number of Hydra Flow mobile pumps in Guyana. Source: NDIA, 2016.

Mobile hydra flow pump is a complete pump station on wheels. The Hydra flow is a submersible axial or mixed flow pump driven by a hydraulic pump and motor through flexible hydraulic lines, instead of a typical long, fixed shaft. The design allows great flexibility, cost savings and speed in the placement of the pump. Since little to no civil works are required to install the Hydra flow pump system, total project costs can be reduced by up to 70%, and its design allows the pumps to be mobile. The portability of the Mobile Hydra flow permits easy movement to various locations where large volumes of water need to be pumped. Everything needed for pumping is mounted on a spring/axle trailer. This includes: the diesel engine, water pump, fuel tank, hydraulic oil reservoir, rigid discharge pipe, flexible discharge hose, and a complete safety shutdown system (MWI Pumps).

Mobile pumps technology are constantly evolving for improved efficiency and durability. Energy efficient mobile pumps for Guyana aligns with the national development thrust for clean technologies and a green economy.	
Institutional /Organizational	The National Drainage and Irrigation Authority (NDIA) is responsible for the implementation of this type of technology. The Authority functions as Guyana's apex organization dealing with all public matters pertaining to management, improvement, extension and provision of drainage, irrigation and flood control infrastructure and services in declared areas of the country (MOA). There may be some collaboration with the Ministry of Public Infrastructure (MoPI).
Adequacy for Current Climate	Highly suitable for the current climate due to the high vulnerability of coastal areas and low lying areas to flooding. The GOG had undertaken to install drainage pumps throughout the coast of Guyana and replacing old and undersized pumps and to deploy additional pumps to meet the growing demand in drainage, due to increased farming acreage under cultivation and to cope with impacts caused by rising sea levels (Guyana Chronicle, 2015).
Size of Potential Beneficiary	The general population in coastal and low lying areas which is approximately 90% of the country's total population.
Disadvantages	• High initial capital cost; and • Need to have reliable maintenance service
Endorsement by experts	Mobile pumps for flood control has gained traction globally and has been introduced in Guyana for some time. However, there is a need for more energy efficient units.
Capital Costs	
Cost to implement/Operate/Maintain	<i>Implementation:</i> • Capital investment cost would depend on the brand, design and capacity of the pumps. Estimated cost for a 120 cubic feet per second discharge capacity mobile pump is US\$250,000. Energy efficient pumps will have a higher cost. <i>Operation/Maintenance:</i> • Cost significantly lower than expenses for stationary /fixed pumps; • Include fuel, cleaning, spare parts, operator/s salary, transport to site/s and security; and • Costs will be higher during periods of flood and drought.
Development Impacts – direct/indirect benefits	
Adaptation benefits	• The adaptation benefits will be significant, especially in the agriculture and health sectors. Mobile pumps will enable the draining of accumulated water in otherwise, hard to reach areas. The ability to drain the land faster will bring relief to flooded farms and households, reducing the loss of crops and livestock, and proliferation of water borne diseases. •
Economic Impacts	• Direct economic benefits will be from cost savings by the NDIA when compared to the civil works required by stationary pumps; • Savings from better efficiency and renewable energy source • Stimulate investment/ enterprise in mobile pump technology and flood control; and • Reduce loss in income from damage to livelihood ventures.

Social Impacts	• Develop/strengthen awareness of climate change and Guyana's vulnerability; • Promote capacity building in communities through their involvement in the operation/maintenance of the pumps; and • Reduce risk from loss of income and livelihood.
Environmental Impacts	• Reduce flooding of coastal lands and salt water intrusion; • Reduce loss of crops and livestock; and • Prevent/minimize damage to buildings/assets.
Local Context	
Status of Technology	Mobile pump technology has been introduced in Guyana. According to the NDIA, there are currently 33 mobile pumps throughout the country, with discharge capacity between 20 – 120 cusec. Most have a discharge capacity of 40 cusec. However, there is a need for energy efficient pumps.
Market potential	The rapid deployment of this technology will build the capacity of the NDIA and other users in flood control. Investors and enterprises are also likely to cash in on providing equipment/materials/maintenance/transportation services
Acceptability to stakeholders	Floods affect many groups of stakeholders. Farmers in particular are a highly vulnerable stakeholder group and the wide dissemination of this technology will be most welcome alongside improved drainage networks.
Opportunities and Barriers	<i>Opportunities:</i> • Wider deployment of this technology would create more awareness about flood control and present opportunities for faster response action on flood events; and • Strengthen Regional and community bodies capacity to use technology. <i>Barriers:</i> • High capital cost; • Limited interest at decision-making levels; and • Lack of know-how about the technology can be a barrier to implementation.
Time Frame	Short to medium term
References	
1. Government of Guyana, (2012): Guyana Second National Communication to the United Nations Framework Convention on Climate Change. 2. Guyana Chronicle (29/10/2015). G\$183M drainage pump commission at Eversham. 3. Guyana Lands and Surveys Commission, 2009. Early Warning System – Situation Report. 4. MWI Corporation – Hydra Flow Pumps http://mwi-egypt.com/ProductDetails.aspx?id=1 5. National Drainage and Irrigation Authority, (2016). Country-wide drainage and irrigation pump status report. Ministry of Agriculture. 6. UNEP RISØ Centre, (2011). Technologies for Climate Change Adaptation – Coastal Erosion and Flooding.	