



METEOROLOGICAL SERVICE DIVISION OF THE  
MINISTRY OF ECONOMIC GROWTH AND JOB CREATION

REQUEST FOR CURRICULA VITAE

**GEOGRAPHIC INFORMATION SYSTEM MODELLING ASSISTANT**

Country: Jamaica  
Project: Establishment of a Comprehensive Bush Fire Warning Index for Effective Bush Fire Management  
Grant No.: GA 46/JAM  
Duration of Assignment: Five months

The Government of Jamaica (GOJ) has received grant funding from the Caribbean Development Bank to develop a comprehensive Jamaican Bush Fire Warning Index to determine critical thresholds for outbreaks under different conditions for effective bush fire management.

The primary objective of the Geographic Information System Modelling Assistant is to assist in weighting the influence of environmental factors on bush fires and account for these factors in the model.

Specific duties and responsibilities of the Geographic Information System Modelling Assistant include *inter alia*:

- (a) determining specific weighting of factors in order to develop a bush fire warning model; and
- (b) using the developed model to determine pilot sites for monitoring bush fires.

**Qualifications and Experience**

The Geographic Information System Modelling Assistant is required to have completed at least three years of undergraduate study, preferably in GIS, Geography, Environmental Sciences, or related disciplines. The GIS Modelling

Assistant shall also possess:

- (a) good research, and organisational skills;
- (b) specific experience in GIS software and Microsoft Office Suite; and
- (c) good communication skills.

The detailed Terms of Reference are available at [www.metservice.gov.jm](http://www.metservice.gov.jm)

Eligible individuals are now invited to submit their CV (in person, or by mail, or by email) no later than June 18, 2018 to:

The Director  
Meteorological Service Division  
65 ¾ Half Way Tree Road  
Kingston 10  
Jamaica  
West Indies.  
Tel: (876) 929-3694; 929-3700  
Email: [procurement@metservice.gov.jm](mailto:procurement@metservice.gov.jm)

## TERMS OF REFERENCE

### GEOGRAPHIC INFORMATION SYSTEM MODELLING ASSISTANT

#### **1. BACKGROUND**

1.01 The African Caribbean Pacific–European Union–Caribbean Development Bank Natural Disaster Risk Management (ACP-EU-CDB NDRM) programme is a part of the Caribbean component of the 10<sup>th</sup> European Development Fund Intra-ACP Cooperation Strategy (2008-2013) in which the ACP Group and the EU recognised the need to increase efforts with regard to *ex ante* Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA). The ACP-EU-CDB NDRM programme aims at reducing the vulnerability to long-term impacts of natural hazards, including the potential impacts of climate change (CC), thereby achieving regional and national sustainable development and poverty reduction goals in the CARIFORUM Countries. The programme comprises four Result Areas (RAs) being managed by three implementing partners, the Caribbean Disaster Emergency Management Agency (CDEMA) (RA 1); CDB (RA 2 and RA 3); and the Ministry of the Presidency of the Dominican Republic (RA 4). CDB's components focus on strengthening regional, national and community level capacities for mitigation, preparedness, management and coordinated response to natural hazards and the effects of CC. The four RAs are:

- (a) **RA 1** - Capacity of National Disaster Management Offices and CDEMA Coordinating Unit Strengthened for Implementation of Comprehensive Disaster Management.
- (b) **RA 2** - National, Local and Regional Resilience Enhanced through Strengthened Early Warning, National Risk Profiling and Community-based DRR.
- (c) **RA 3** - Sector Resilience Strengthened in Key Public Sectors, through DRR and CCA Mainstreaming.
- (d) **RA 4** - Capacity building and the Establishment of Common Policies, Strategies, Programmes and Sub-programmes Undertaken as a Contribution.

1.02 Bush fires occur naturally and play a role in the evolution of the landscape, soil fertility and biodiversity. Over the last two decades, an increase has been observed in the incidence of bush fires during the dry season (especially January-March) and especially during periods of severe drought in Jamaica. An increase in the risk of droughts has been predicted with the occurring global warning<sup>1</sup> resulting from human activities that contribute to increasing concentrations of greenhouse gases in the atmosphere. Thus, it can be inferred that climate variability and climate change will likely result in an ever-increasing number of drought-induced bush fires in Jamaica.

1.03 Bush fires have caused significant negative socio-economic impacts particularly on property and the agriculture and forestry sectors in Jamaica. Between 1996 and 2005, damage and losses in agriculture due to bush fires were estimated at USD0.7 million (mn) over the years<sup>2</sup>. In 2014, the Rural Agricultural Development Authority reported over 1,600 hectares of land valued at over USD8.33 mn was lost or damaged due to drought and fires and affected over 16,000 farmers<sup>3</sup>. In 2015, 7,261 of such fires occurred. In May 2015, a bush fire event in rural St. Andrew, destroyed approximately 367 hectares of forest cover<sup>4</sup>,

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<sup>1</sup> Intergovernmental Panel on Climate Change (IPCC), 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the IPCC [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

<sup>2</sup> Selvaraju, Ramasamy, et al. Climate change and agriculture in Jamaica: Agricultural sector support analysis. FAO, 2013.

<sup>3</sup> <http://jis.gov.jm/statement-drought-conditions-impact-agricultural-sector>.

<sup>4</sup> <http://jis.gov.jm/bush-fires-have-destroyed-hundreds-of-acres>.

contributing to an increase in air pollution with adverse impact on human health, as well as the removal of key carbon sinks. Currently, bush fires account for 63%<sup>5</sup> of the total number of emergency calls to the Jamaica Fire Brigade (JFB).

1.04 The Meteorological Services of Jamaica (MSJ) in collaboration with the International Research Institute for Climate and Society and the Caribbean Institute for Meteorology and Hydrology have worked to develop a one-to-five-day forecast tool which attempts to predict likely outbreaks of bush fires. This is done via the use of the Keetch-Byram Drought Index (KBDI), which was developed by John Keetch and George Byram in 1968 to specifically assess forest fire potential. This drought index represents the net effect of evapotranspiration and precipitation in producing loss in moisture content of the upper level of the soil including organic matter. The KBDI is computed from annual precipitation, daily precipitation and daily maximum temperature. The values of the KBDI ranges from 0-800, with higher values indicating drier conditions and higher risk of fire.

1.05 Although KBDI is useful for fire potential assessment, its application as an early warning tool and decision-making aid for fire management is limited as the index lacks customisation to local conditions and does not include other key factors of fire behaviour such as vegetation (sometimes termed as fuel loading) and topography. For instance, while weather conditions mainly influence the start of a bush fire, it is the vegetation and topography that dictate the maintenance and spread of fire. Under similar weather conditions, two zones with a different vegetation (e.g. grass versus trees) will experience a different bush fire behaviour. Generally grasslands are more conducive to fires than forests as the latter is coarser and slower to combust. When weather conditions and vegetation are similar, zones with differing gradient (e.g. flat land versus sloping) will not exhibit the same bush fire behaviour. Fires will tend to spread faster on a slope than on flat ground. Therefore, integrating weather, vegetation and topography in the determination of the bush fire index will increase its accuracy.

1.06 The development of a robust model aside, a common alerting protocol and public education and awareness are critical to ensure timely preparation and effective response to bush fires. Following a series of devastating fires that affected farms in Mavis Bank, St. Andrew, and Nain in St. Elizabeth, Jamaica in 2015, JFB launched a Community Bush Fire Management Education Programme, which has shown great success. At October 2016, no incident of fire was observed in Mavis Bank, where fires destroyed acres of farmland last year. A key element of this success is due to local community involvement in the programme.

1.07 The Government of Jamaica through the MSJ is proposing to develop a comprehensive Jamaican Bush Fire Warning Index to determine critical thresholds for outbreaks under different conditions for effective bush fire management. The current proposal include four components: (a) development of a multi-criteria model weighing KBDI as well as topography and vegetation factors; (b) pilot sites monitoring; (c) development of alerting protocol; and (d) public education and awareness campaign. This work requires an interdisciplinary approach and inter-agency coordinated effort.

1.08 The consultancy is directed at assisting with bush fire data collection and analysis process to build the multi-criteria bush fire index in Jamaica.

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<sup>5</sup> Average between 2007 and 2014 – Auditor General’s Department Performance Audit Report of the JFB.

## **2. OBJECTIVE**

2.01 The primary objective of this position is to assist in weighting the influence of environmental factors on bush fires and account for these factors in the model.

## **3. SCOPE OF WORK**

3.01 The scope of services is understood to cover all activities necessary to accomplish the objectives of the consultancy, whether or not a specific activity is cited in these Terms of Reference (TOR). The draft TOR will be finalised based on discussions with the Geographic Information System (GIS) Modelling Assistant. A participatory and consultative approach is to be encouraged in the conduct of the services, which will contribute to their completion in as timely a manner as possible.

3.02 Specific duties and responsibilities of the GIS Modelling Assistant include *inter alia*:

- (a) determining specific weighting of factors in order to develop a bush fire warning model; and
- (b) using the developed model to determine pilot sites for monitoring bush fires.

## **4. QUALIFICATIONS AND EXPERIENCE**

4.01 The GIS Modelling Assistant is required to have completed at least three years of undergraduate study, preferably in GIS, Geography, Environmental Sciences, or related disciplines. The GIS Modelling Assistant shall also possess:

- (a) good research, and organisational skills;
- (b) specific experience in GIS software and Microsoft Office Suite; and
- (c) good communication skills.

## **5. REPORTING REQUIREMENTS AND DELIVERABLES**

5.01 The GIS Modelling Assistant will be required to collaboratively map incidences of bush fire on a GIS platform.

## **6. DURATION**

6.01 The duration of this assignment is five months.