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Climate Change Adaptation to Manage the Risks of Extreme Hydrological and Weather Events for Food Security in Vulnerable West Nile Delta

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The West Delta area of the River Nile in Egypt is a vulnerable agricultural area against extreme events and climate changes and sea level rise. The region has a total area of the 179 000 sq km, representing around 17.7% of the total area of Egypt. The zone has diverse water sources: Nile water, ground water and rainfall particularly in the northern areas where rainfall is enough for agricultural production. Climate conditions are relatively mild in respect of temperature, allowing for diversified agricultural products. Rainfall over Nile Delta is concentrated in northern coast and the North West in winter season. Occasionally, the weather systems combination led to the atmospheric instability which involved vertical velocity, divergence, and vorticity at the high levels. The previous synoptic situation and the resulting meteorological condition lead to heavy rainfall. In November 2015 and December 2015, the area was exposed to severe rainfall with a range of 180 mm accumulated in three days which resulted to destroying more than 70,000 ha of agriculture lands. There were several losses of human life, road damage, many flooded villages and significant loss of livestock.

This study is to build an integrated management system for this area which is considered a relatively poor region from the socio-economic point of view. Farmers are the main stockholders in the area specially that the level of landholder ownership is in the range of 2 acres per farmer on average. In addition, there are other stakeholders from the institutional the irrigation and agricultural departments, water user associations, and civil defense department. Accordingly, the study aims at introducing an intensive investigation to determine a risk assessment map for the area. A numerical modeling, satellite image analysis, field experiments, and advanced calculation tools to simulate the area to assimilate the extreme weather system, existing physical system of the area that includes the irrigation network, roads, urban areas and natural resources. Thus, the study will ultimately end up with a design of an early warning system for the entire area to accommodate the problem of extreme events occurrence such as heavy rainfall storms.