Background

Agro-ecological systems function beyond one-dimensional understanding, rather they embrace a multi-dimensional structure, where ecological and social elements co-evolve through the dynamics of interacting processes (Vandermeer, 1995).

In the face of global changes, agro-ecological systems have a crucial role in understanding the elements defining vulnerability and contributing to adaptation of rural communities at risk of natural hazards.

Analysed through the lenses of Social-Ecological System (SES), the research aims to develop a representative model of the agro-ecological system dynamics and explore the role of such systems in provisioning of ecosystem services with high importance for adapting to a changing world.

Objectives

Better understanding of the socio-ecological system’s dynamics under flooding stress by including the complex set of natural and human providers and beneficiaries of services in the context of ecosystem-based adaptation and disaster risk management. Explore the role such model could play in facilitating decision-making processes in mainstreaming ecosystem approach to climate change adaptation.

Case study

Guyana – Land of many waters

The coastline in Guyana is dominated by agricultural arvities, which account for approximately 28% of national GDP and 30% of employment in the country.

Yet, in many areas the coast is between 0.5 to 1.0 m and more below sea level at spring tide, making it prone to strong tidal influences and extremely vulnerable to storm surges and sea level rise. The study is focused on agro-ecosystems in Pomeroon and West Demerara regions.

Conceptual framework

The conceptual framework is founded on the existing vulnerability framework and ES concept proposes to link ecosystem services generated by agro-ecosystems with the components defining vulnerability of a farm system to identify factors and processes, which could strengthen its resilience to natural hazards as floods. The framework serves as a foundation for the development of a system dynamic modeling exercise further in the study which has the objective to explore the role of ecosystem services provision from sustainable land management practices.

References


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Tab.1 List of vulnerability components in an agro-ecosystem and selected indicators.

Component Sub-component Indicator

Dependence
Deserti climate events Flood/droughts Area under cultivation Population density

Sensitivity
Social sensitivity Poverty index Injured land

Ecological sensitivity Land degradation index

Capacity
Social coping capacity Net farm income Food production Agricultural occupation 

Social adaptive capacity Water management governance Poverty level 

Farm tenures rights 

Ecological capacity Surface water storage

Tab.2 Characteristics of farms in Pomeroon and West Demerara regions.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Regions</th>
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<tbody>
<tr>
<td></td>
<td>Pomeroon (Region 2)</td>
</tr>
<tr>
<td>Farm size (ha)</td>
<td>9,480</td>
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<tr>
<td>Population</td>
<td>46,835</td>
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<tr>
<td></td>
<td>90</td>
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<tr>
<td></td>
<td>8</td>
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<td>2</td>
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<tr>
<td></td>
<td>16.5</td>
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<td>23.4</td>
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<td>55</td>
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<td>22</td>
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<tr>
<td>Crop production system</td>
<td>leguminous: plant, soy, cowpea, cowpea, groundnut, cotton, yam, sweet potato, Vegetables: corn, cabbage, hot pepper, mangoes, papayas, mango, sweet potato, kiwi, avocado, mango, pineapple, coconut, etc.</td>
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