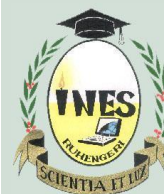


INSTITUT D'ENSEIGNEMENT SUPÉRIEUR DE RUHENGERI



Scientia et Lux

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Flood Emergency Response Advisor

Faculty: AFS

Department: Computer Science

Class: SWE A year3

Course: Artificial Intelligence

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Scenario: Flood Emergency Response Advisor

Key Outcome: Suggest Safety Actions During Floods

Use Case Definition & Rule Identification

Task 1: Problem definition and Relevance in the Rwandan/African Context

Floods pose a significant challenge in Rwanda and across the African continent, driven by a combination of natural and human-induced factors. In Rwanda, heavy rainfall, hilly terrain, and deforestation exacerbate flooding and landslide risks, particularly in the western, northern, and southern provinces. Recent events, such as the May 2023 floods that claimed over 130 lives and displaced thousands, highlight the urgency of effective emergency responses. Across Africa, urbanization, inadequate infrastructure, and climate change amplify flood impacts, disproportionately affecting vulnerable communities with limited resources.

This issue is highly relevant because floods disrupt lives, destroy livelihoods (e.g., agriculture), and strain national resources. In Rwanda, a landlocked country with a dense population, floods threaten food security and economic stability, necessitating proactive safety measures. In the broader African context, recurring floods in countries like Nigeria and South Africa underscore the need for scalable, context-specific responses tailored to local capacities and challenges.

Task 2: Key Stakeholders and IF-THEN Rules Key

Stakeholders:

1. Government Agencies:

- Ministry in Charge of Emergency Management (MINEMA) in Rwanda coordinates disaster response and recovery.
- Local governments manage on-the-ground implementation.

2. Communities:

- Residents in flood-prone areas are the primary affected group and first responders in emergencies.

3. NGOs and Humanitarian Organizations:

- Rwanda Red Cross, IFRC, and others provide relief, evacuation support, and resources.

4. Meteorological Agencies:

- Rwanda Meteorological Agency provides weather forecasts and early warnings.

5. International Partners:

- World Bank, UN agencies, and donors fund resilience projects and emergency aid.

IF-THEN Rules:

These rules outline actionable steps based on flood-related conditions:

1. **IF** heavy rainfall is forecast (e.g., >100 mm in 24 hours), **THEN** issue early warnings via radio, SMS, and community leaders.
2. **IF** water levels rise rapidly in rivers or low-lying areas, **THEN** evacuate residents to higher ground or designated shelters.
3. **IF** roads become impassable due to flooding, **THEN** deploy emergency teams with boats or aerial support for rescue.
4. **IF** households lack clean water post-flood, **THEN** distribute water purification tablets and establish temporary water points.
5. **IF** a community is isolated due to damaged infrastructure, **THEN** prioritize food and medical supply drops.
6. **IF** flooding exceeds local response capacity, **THEN** request national or international assistance.

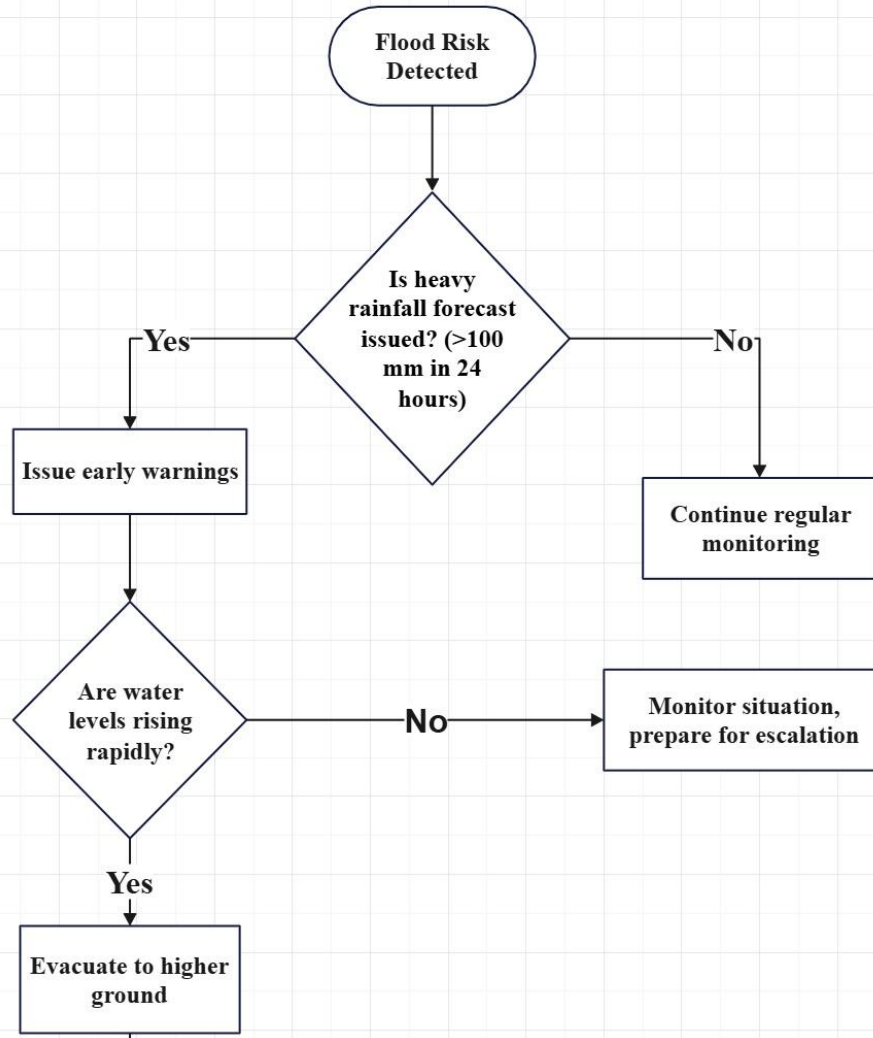
Task 3: Initial Decision Tree/Flowchart

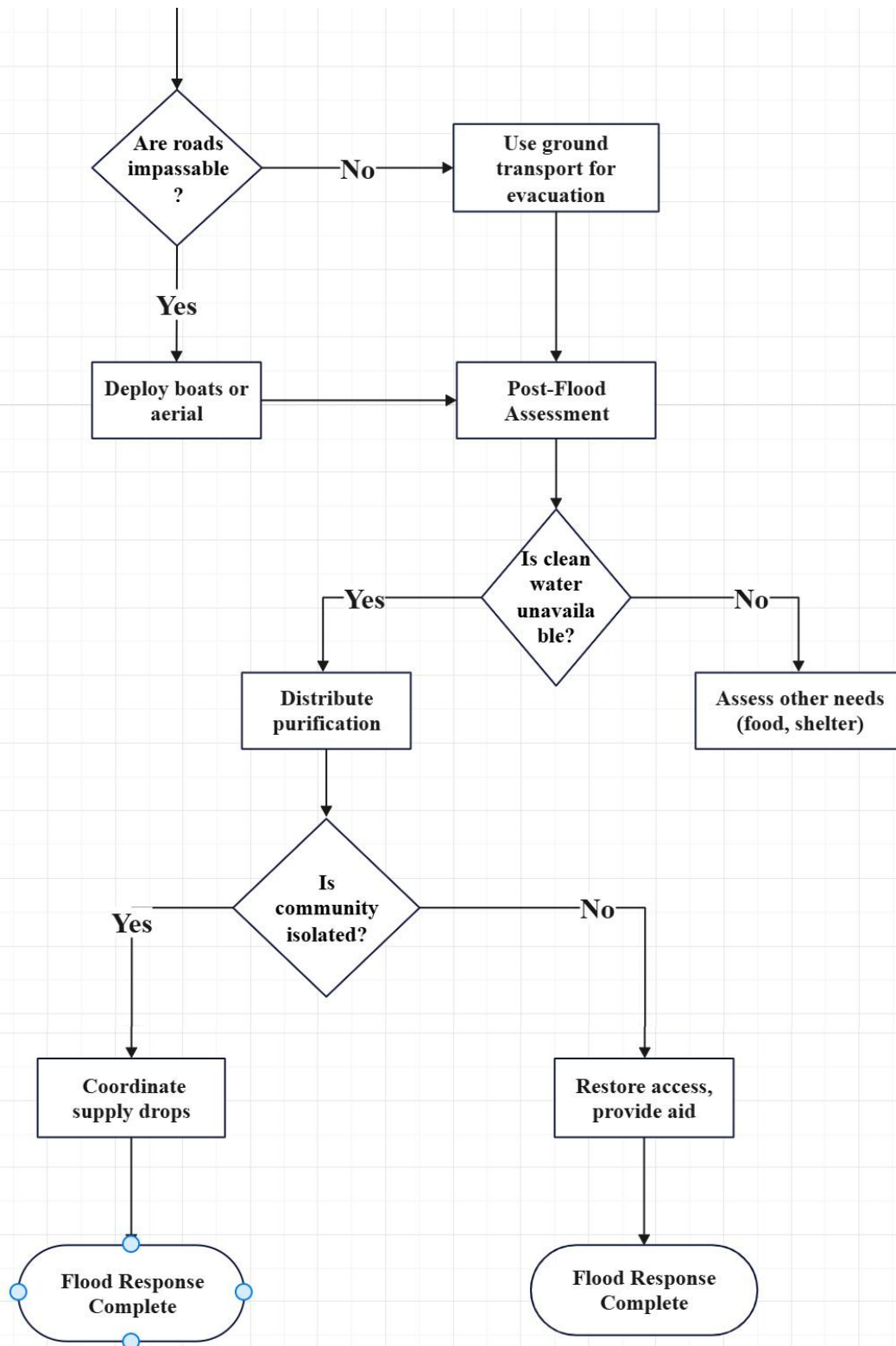
Below is a simplified decision Flowchart for flood emergency response safety actions in Rwanda/African context:

Explanation of the Decision Tree:

1. **Pre-Flood Phase:** Begins with weather forecasts. If heavy rain is predicted, warnings are disseminated to prepare communities.
2. **During the Flood Phase:** As conditions worsen (e.g., rising water levels), evacuation becomes the priority. Accessibility determines the mode of rescue.
3. **Post-Flood Phase:** Focus shifts to immediate needs like water and food, especially for isolated areas.

Flood Emergency Response Advisor





Suggested Safety Actions (Derived from the Decision Tree):

1. **Stay Informed:** Monitor weather updates from local meteorological agencies.
2. **Evacuate Early:** Move to higher ground or shelters if water levels rise.
3. **Avoid Floodwaters:** Do not walk or drive through moving water to prevent drowning or being swept away.
4. **Secure Clean Water:** Use purification tablets or boiled water if supplies are contaminated.
5. **Seek Help:** Contact local authorities or NGOs if trapped or in need of supplies.

This framework ensures a structured, practical response tailored to the Rwandan and African context, balancing local realities with effective safety measures.