UAV applications for Disaster Risk Management in agriculture: Experiences from Myanmar

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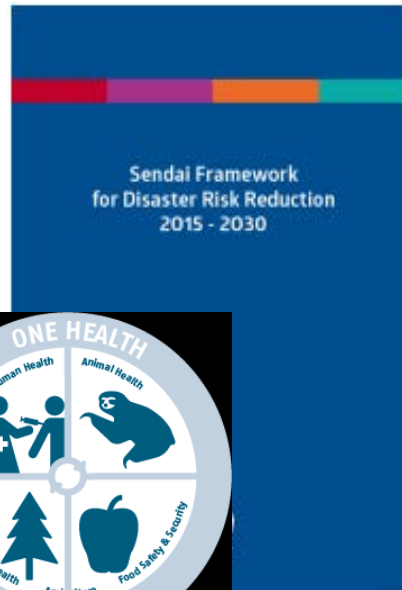Fisheries Specialist (Disaster Risk Management)
FAO Myanmar

OUTLINE

- **Video**

- **Climate Change, DRR and Resilience-related processes**

- **Related National Strategies and Policy Frameworks**

- **Myanmar's vulnerability to CC and Impacts of Disasters on Agriculture**

- **Towards a new way of working**

- **Examples of Drone Applications in Myanmar**

- **Considerations for Institutionalizing Drone Applications for DRR/DRM in Agriculture**

Climate Change, DRR and Resilience-related global policy processes

Guiding international agendas include the 2030 SDGs, Sendai Framework (SFDRR), COP21 Climate Agreement, CFS-FFA, One Health.

DRR and resilience governance is about strengthening and supporting institutional frameworks and capacities of countries and stakeholders for improved risk reduction and management of threats and crises that affect agriculture, food and nutrition.
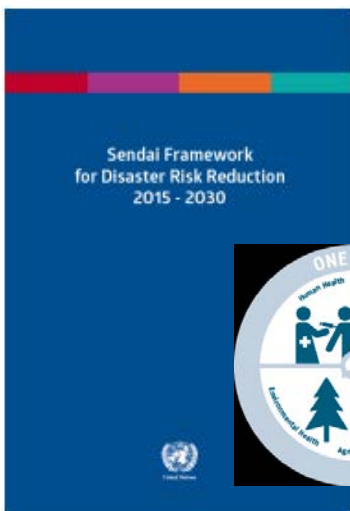

Sendai Framework for Disaster Risk Reduction 2015 - 2030

ONE HEALTH

Human Health — Animal Health — Environmental Health — Agriculture — Food Safety & Security

CFS
COMMITTEE ON WORLD FOOD SECURITY

COP21 · CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

NO POVERTY | 2 ZERO HUNGER | 3 GOOD HEALTH | 4 QUALITY EDUCATION | 5 GENDER EQUALITY | 6 CLEAN WATER AND SANITATION | 7 CLEAN ENERGY

8 GOOD JOBS AND ECONOMIC GROWTH | 9 INNOVATION AND INFRASTRUCTURE | 10 REDUCED INEQUALITIES | 11 SUSTAINABLE CITIES AND COMMUNITIES | 12 RESPONSIBLE CONSUMPTION | 13 PROTECT THE PLANET | 14 LIFE BELOW WATER

15 LIFE ON LAND | 16 PEACE AND JUSTICE | 17 PARTNERSHIPS FOR THE GOALS | THE GLOBAL GOALS

MYANMAR
Related National Development Strategies, National Legislations and Policy Frameworks

- Environmental Conservation Law, 2012
- National Disaster Management Law, 2013
- Myanmar Action Plan on Disaster Risk Reduction (MAPDRR), 2017
- Myanmar National Framework for Community Disaster Resilience (2017)
- Myanmar Climate Change Strategy and Action Plan 2016-2030
- Climate Smart Agriculture Strategy
- Agriculture Development Strategy

- Election Manifesto, National League for Democracy, 2015
- Framework for Economic and Social Reforms, 2013
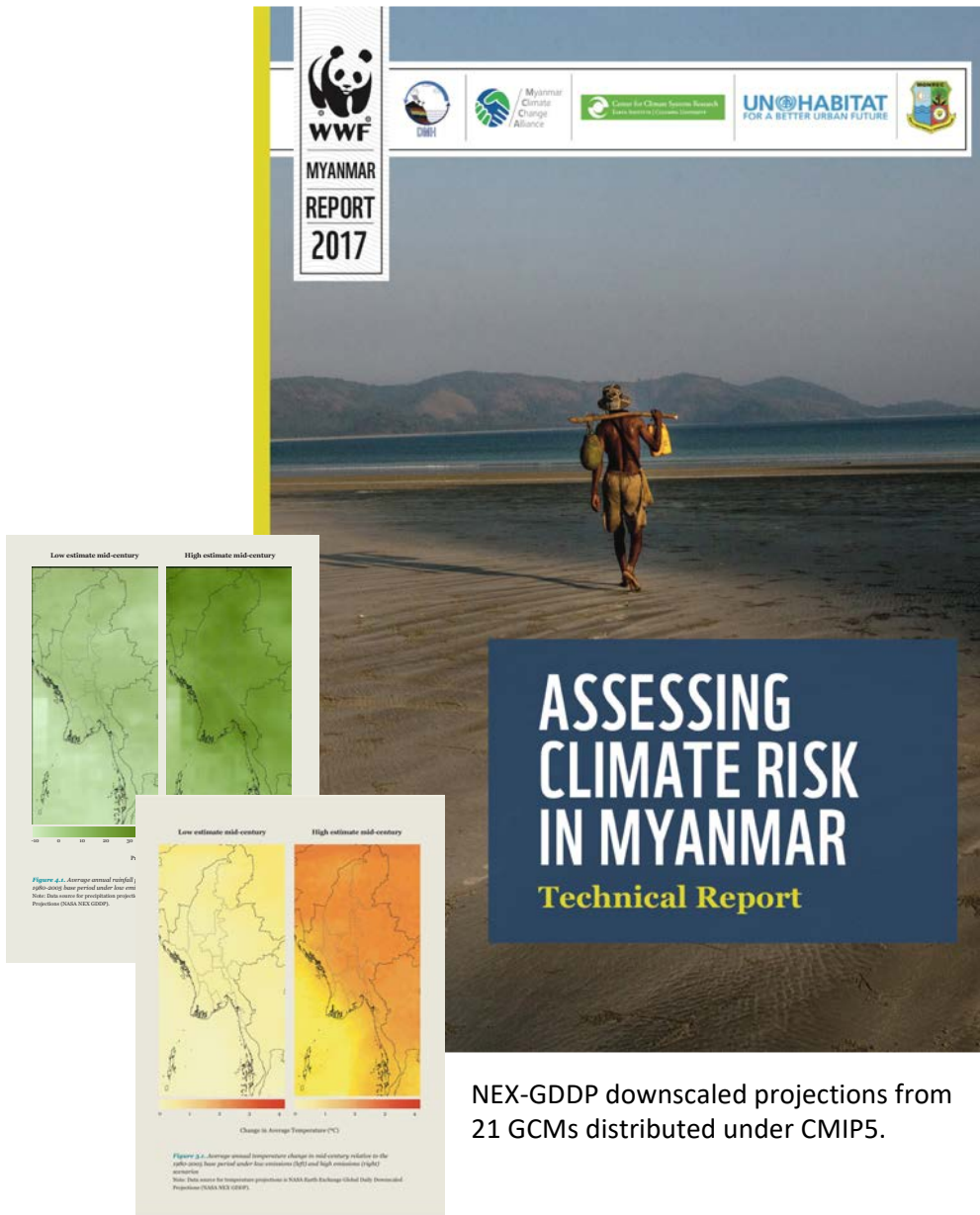- Rural Development Strategic Framework, 2014
- National Social Protection Strategic Plan, 2014
- Myanmar Financial Inclusion Roadmap, 2015
- National Strategic Plan for the Advancement of Women, 2013-2022
- Soon: Agriculture Action Plan for DRR

Vulnerability Context of Myanmar: Slow-onset Climate Change Impacts

NEX-GDDP downscaled projections from 21 GCMs distributed under CMIP5.

In every region in Myanmar, temperatures are expected to increase by the middle of the century.

Temperatures are projected to rise by 1.3°C to 2.7°C above historical levels

The Eastern and Northern Hilly Regions are likely to see the most dramatic warming rising by up to 3°C.

Precipitation gains are most likely to occur during the monsoon season.

How about the agriculture sector?

Source: FAO, based on data from PDNAs

The impact of disasters on agriculture

Share of disaster impact absorbed by agriculture in developing countries, 2006–2016
(based on 74 PDNAs in 53 developing countries)

An FAO study in 2017 found that the agriculture sector absorbed 23% of all Damage and Losses caused by natural hazards
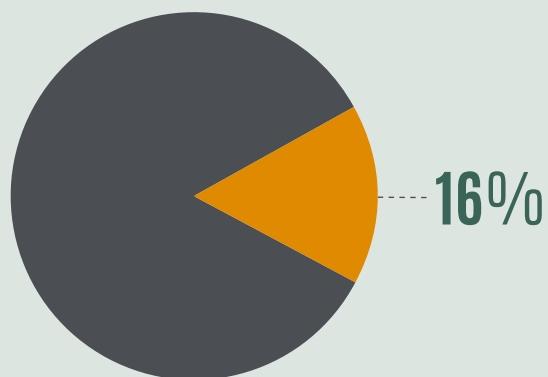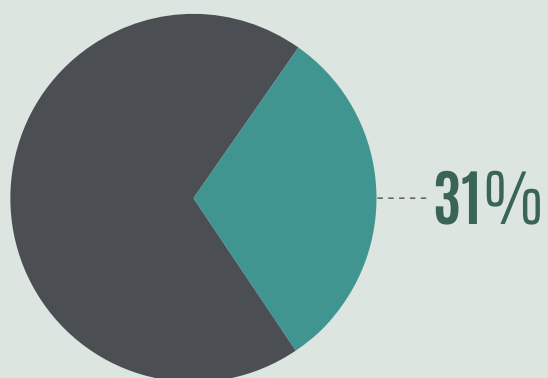
Includes assets and infrastructure

2 PDNAs from Myanmar

Cyclone Nargis (2008) where agriculture damage and losses as % of total: 17%

Floods and landslides (2015) where agriculture damage and losses as % of total: 37%
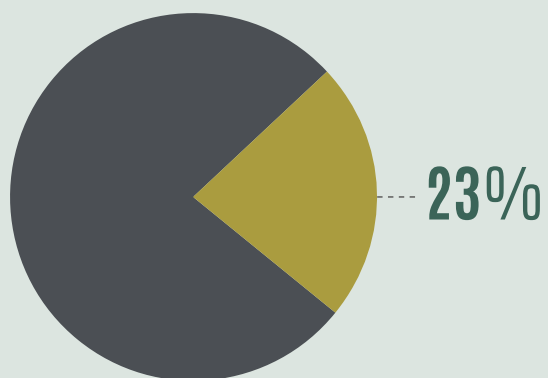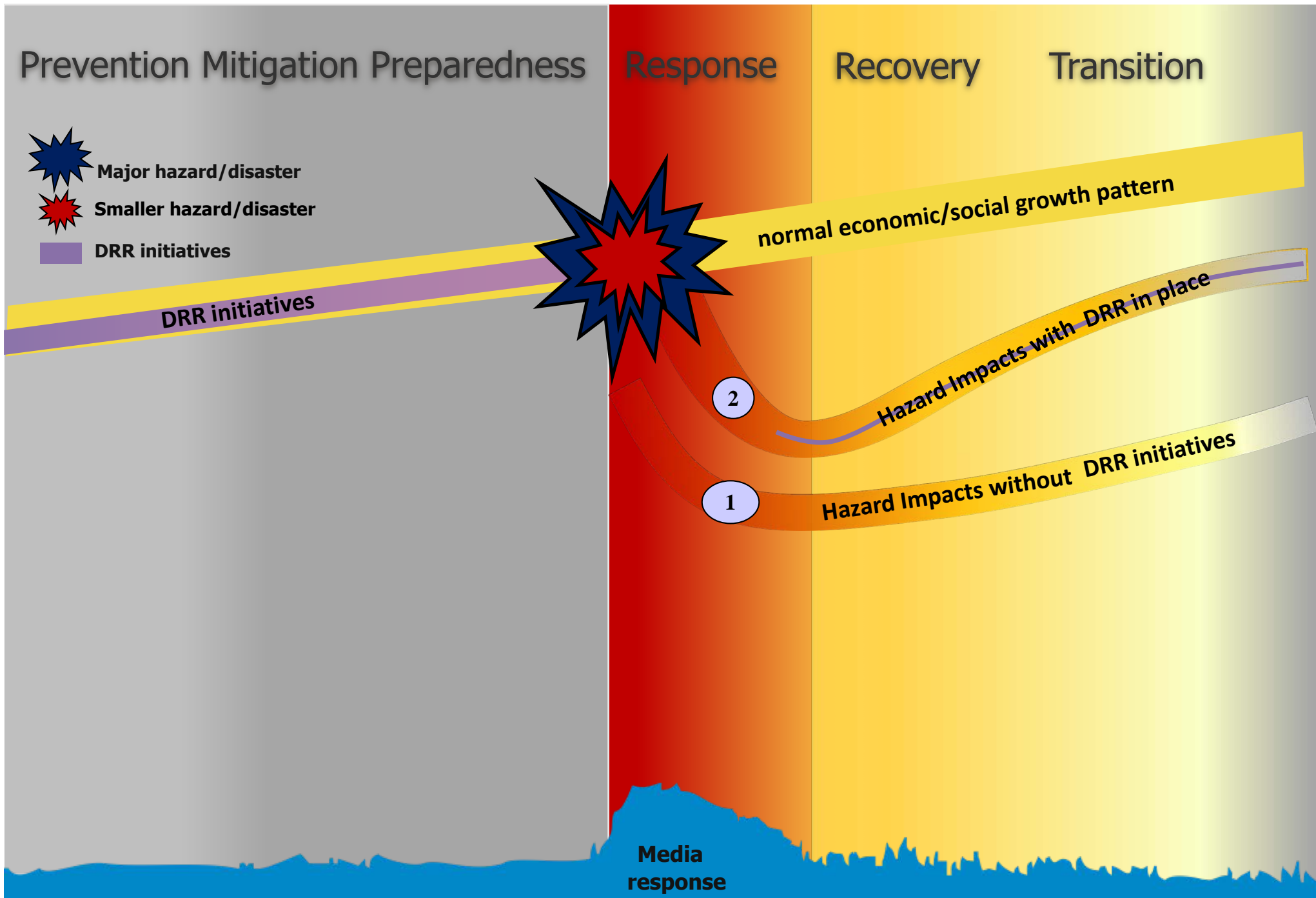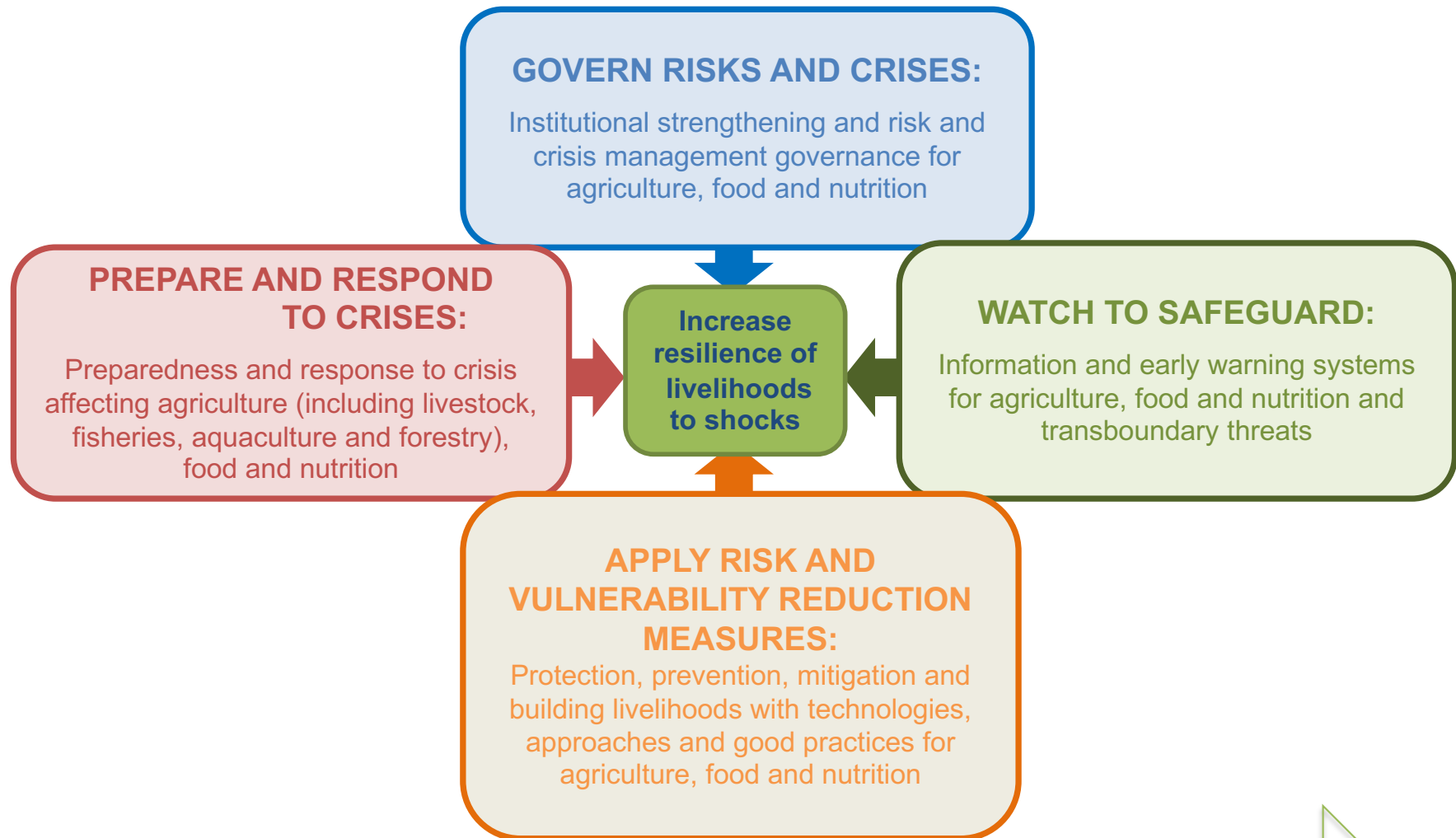
PDNAs distinguish damage – the total or partial destruction of physical assets – from losses, which are changes in economic flows.

Disaster Risk Management Framework

Prevention Mitigation Preparedness | Response | Recovery | Transition

Major hazard/disaster

Smaller hazard/disaster

DRR initiatives

DRR initiatives

normal economic/social growth pattern

2

Hazard Impacts with DRR in place

1

Hazard Impacts without DRR initiatives

Media response

FAO's Resilience and DRR Approach

GOVERN RISKS AND CRISES:
Institutional strengthening and risk and crisis management governance for agriculture, food and nutrition

PREPARE AND RESPOND TO CRISES:
Preparedness and response to crisis affecting agriculture (including livestock, fisheries, aquaculture and forestry), food and nutrition

Increase resilience of livelihoods to shocks

WATCH TO SAFEGUARD:
Information and early warning systems for agriculture, food and nutrition and transboundary threats

APPLY RISK AND VULNERABILITY REDUCTION MEASURES:
Protection, prevention, mitigation and building livelihoods with technologies, approaches and good practices for agriculture, food and nutrition

7 Core Functions: Standards, Information management, Policy dialogue, Capacity development, Knowledge management, Strategic partnerships, Communication

Cross-cutting themes: Governance, Gender, Statistics, Climate Change

TOWARDS A NEW WAY OF WORKING

- The Sendai Framework for Disaster Risk Reduction - recognized the need to increase the utilization of modern geospatial technologies

- The World Humanitarian Summit - underscored the need to shift from reactively managing crises to proactively reducing risks; decision-making should be based on data and common risk analysis.

- On September 2016 and following an official request from the Ministry of Agriculture, Livestock and Irrigation (MOALI), FAO formally collaborated with the Ministry of Education through its Myanmar Aerospace Engineering University (MAEU)

- Preliminary mapping approaches and methodologies inspired from pioneering work of FAO and the Department of Agriculture in the Philippines in 2015

EXPLORING THE APPLICATION OF DRONE MAPPING TECHNOLOGY IN MYANMAR – THE 2016 MYANMAR FLOODS

Rapid mapping missions were carried out to inform village assessments and profiling, as well as beneficiary identification (3,600 hectares with a ground resolution of up to 5 cm)
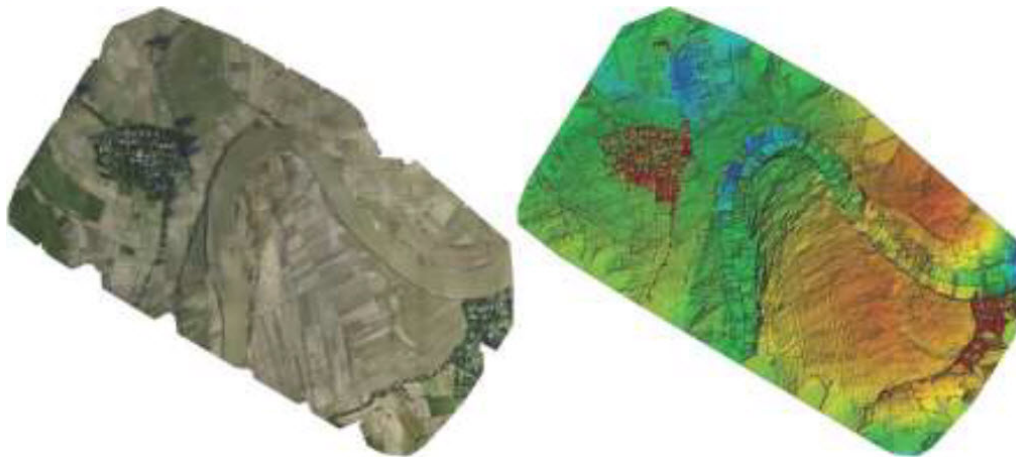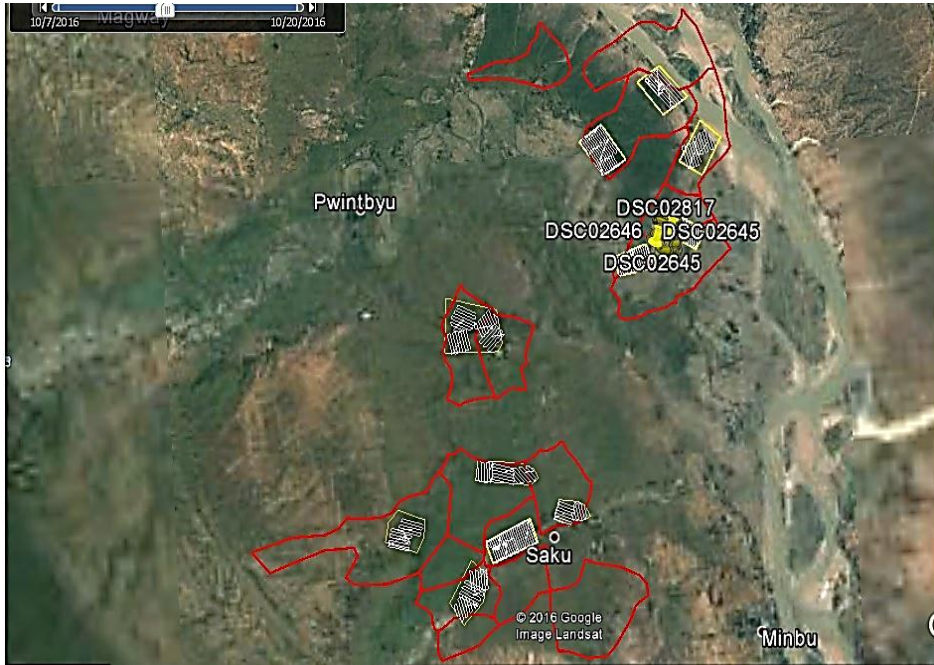
Mapping Sites were identified based on:

1. Standing Crop and Damage Reports from Department of Agriculture
2. Consultation with MOALI officials
3. Consultation with township and village officials
4. Safety/Logistics/Ease of Access

Find suitable entry points

EXPLORING THE APPLICATION OF DRONE MAPPING TECHNOLOGY IN MYANMAR – THE 2016 MYANMAR FLOODS

FROM LOWLAND TO UPLANDS: DRONE MAPPING TECHNOLOGY IN HIGHLY REMOTE UPLAND AGRICULTURAL COMMUNITIES

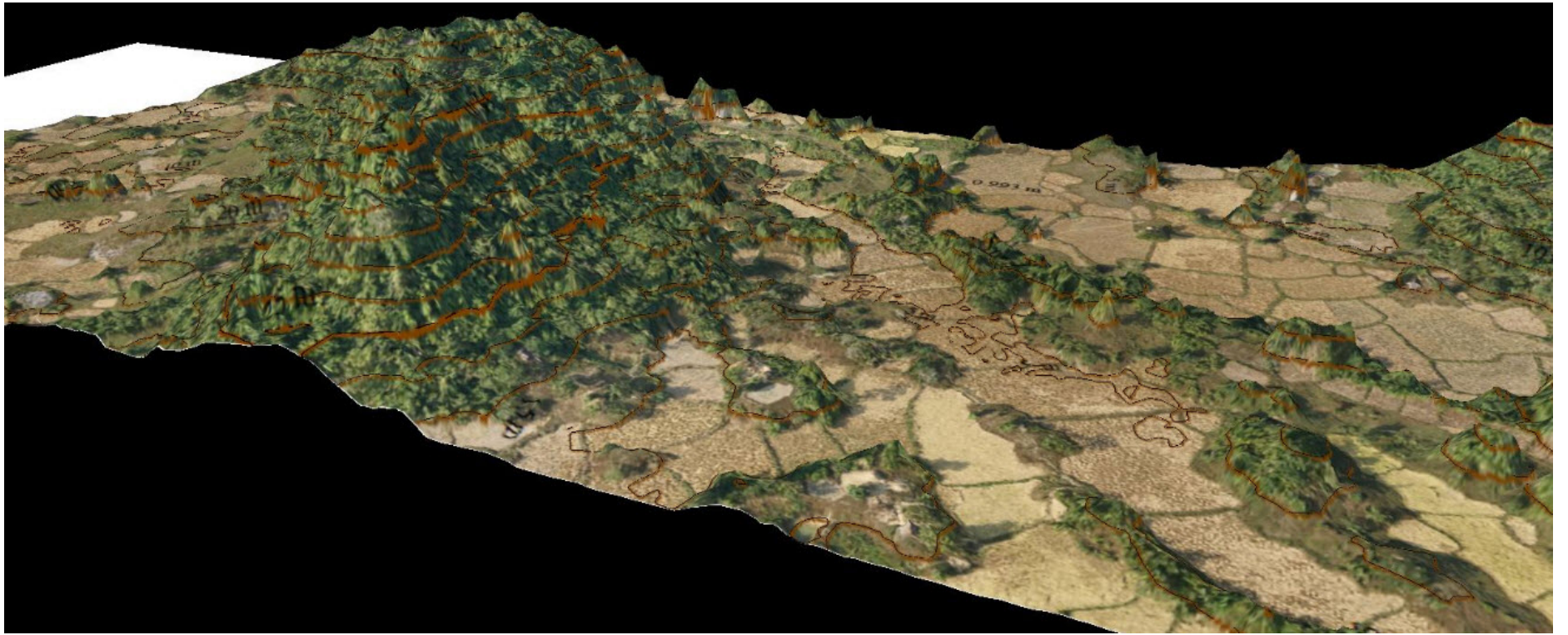## Drone Mapping technology revolutionizes Community-based risk assessments and planning

Hakha, Chin State

The maps allow community officials to examine aerial images with very high detail.

Enables increased appreciation of agriculture and environmental features, and better understanding of hazards and risks.

Build a case

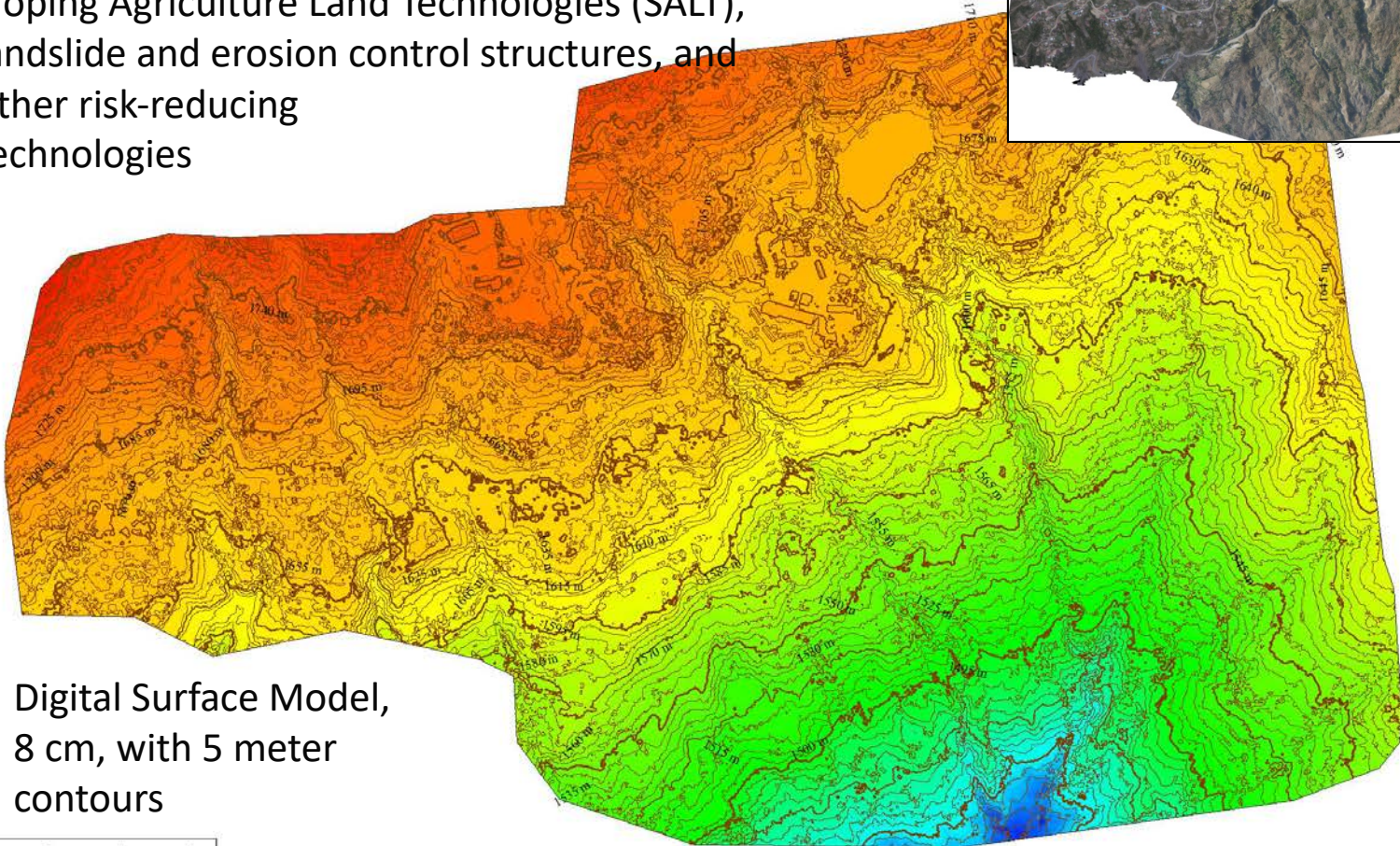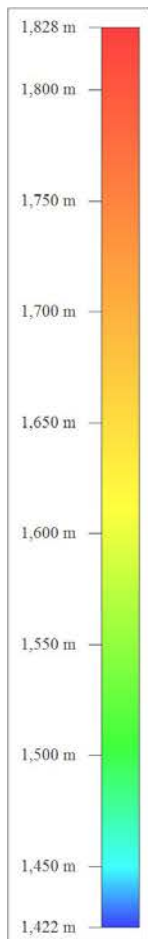Conventional Community Hazard Map:

Paper and crayons
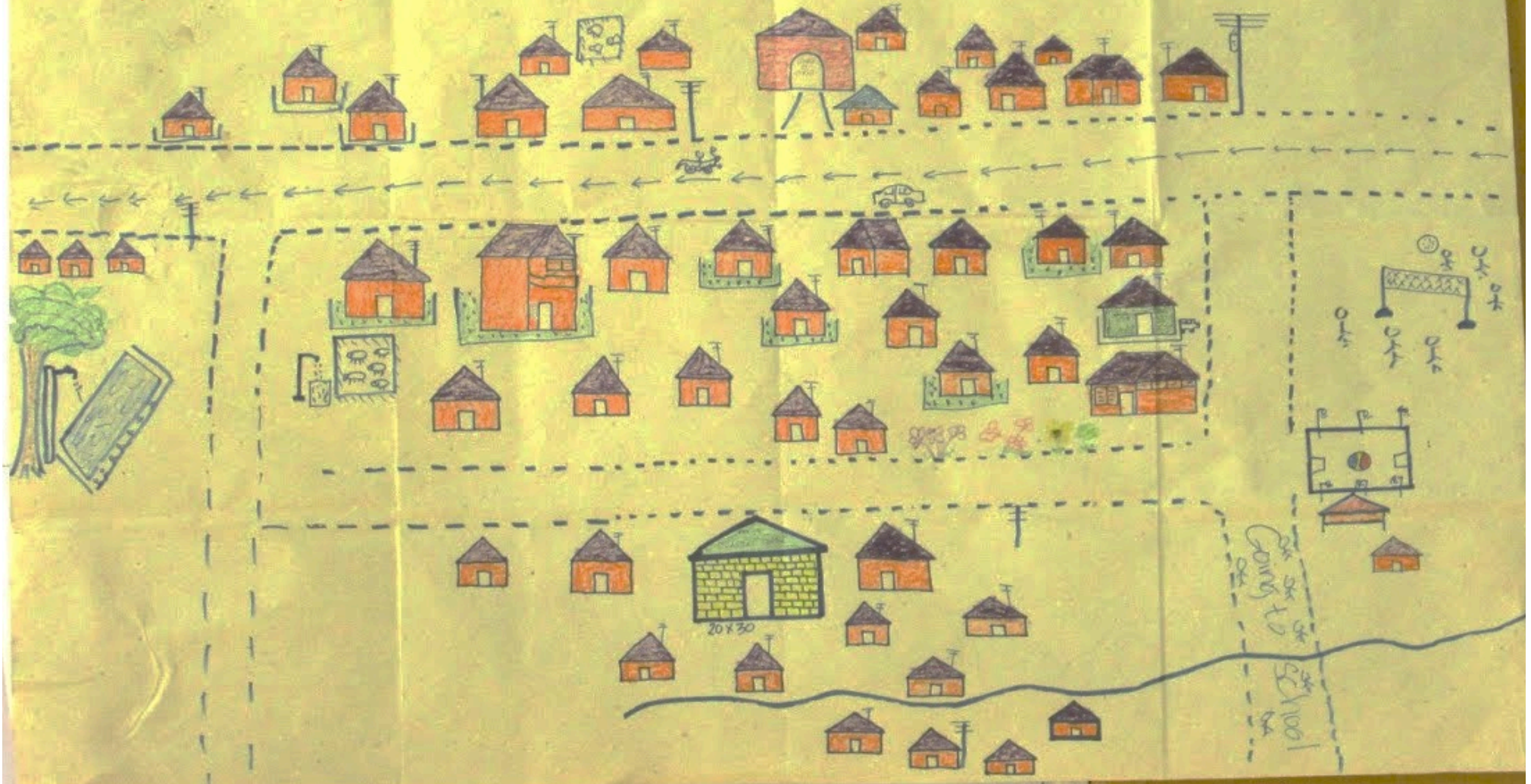
Provides more accurate data to government experts and scientists – results in better decisions and interventions

Hakha, Chin State

Data can help improve the planning/ design of Sloping Agriculture Land Technologies (SALT), landslide and erosion control structures, and other risk-reducing technologies

Digital Surface Model, 8 cm, with 5 meter contours
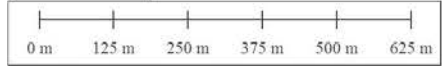
INSTITUTIONALIZING DRONE MAPPING TECHNOLOGY AND CAPACITIES FOR AGRICULTURE

Establishment of the MOALI DRR Task Force and Drone Mapping Team on 29 March 2017.

The drone mapping consists of 30 inter-disciplinary experts from the different Departments and universities across MoALI (Agriculture, Livestock, Extension, Research, Irrigation, Land Statistics, YAU, UVS, Mechanization, Cooperatives, Planning and others).

Formal launch of the MOALI Drone Mapping Team on August 2017

Training Design/Topics

1. Design and Control Systems of Unmanned Aerial Vehicles
2. Basic Theory of Aerodynamics
3. Piloting drones based on international aviation standards, including safe and lawful use
4. Survey applications of photogrammetry
5. Navigation Systems
6. Flight planning
6. Ground Control Stations of Drone systems
7. Drone set-up/assembly and disassembly
8. RS/GIS Technologies for Agriculture Applications
9. Data Processing and applied map production
10. Mission and sector-specific flight planning and analysis (including site selection, sample area design, scientific standards, aerial sampling patterns/methods, etc.)
11. UAV operations (the whole package)
12. UAV retrieval, on-site repair, contingency plans, and others.

Flight Simulation Training
Ground School/Practical flight

Beyond agriculture: utilizing Drone Mapping Technology Across Sectors

The 2017 Monsoon/Cyclone Season

MOALI, MAEU and FAO carried out a collaborative mapping activity with the Relief and Resettlement Department (RRD), Ministry of Social Welfare, Relief and Resettlement in July 2017

Produced aerial maps and conducted Real time Video Monitoring for Emergency Response and Resettlement in flooded areas in Pakuoku and Myintbu townships in Magway Region
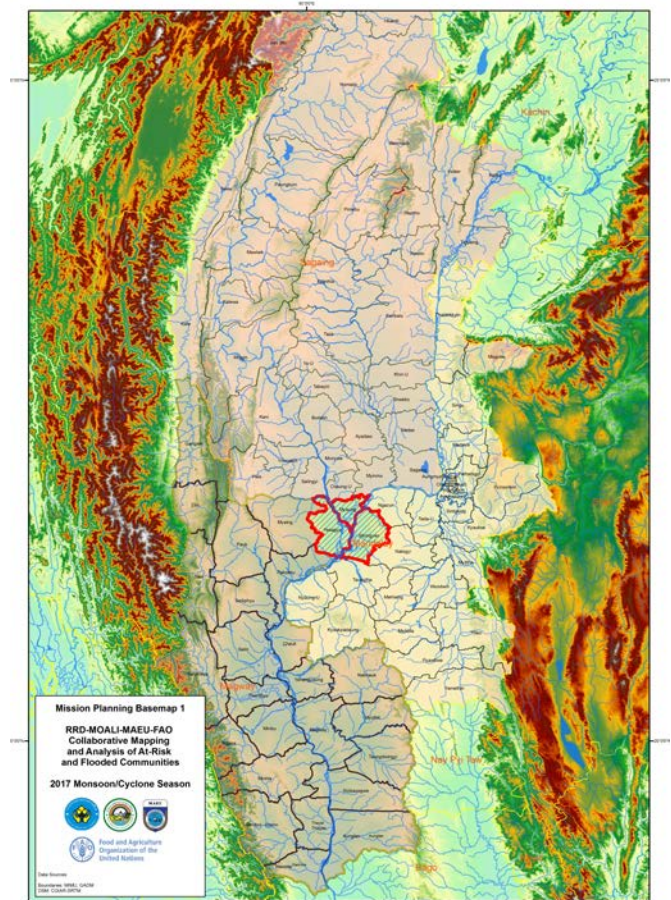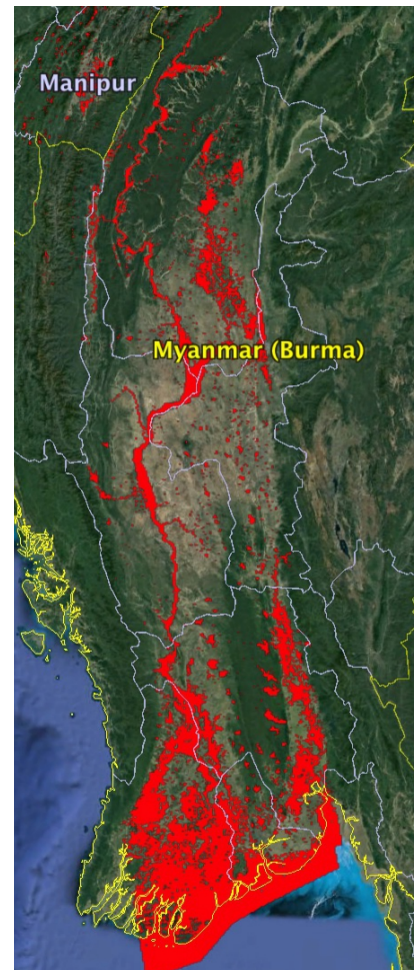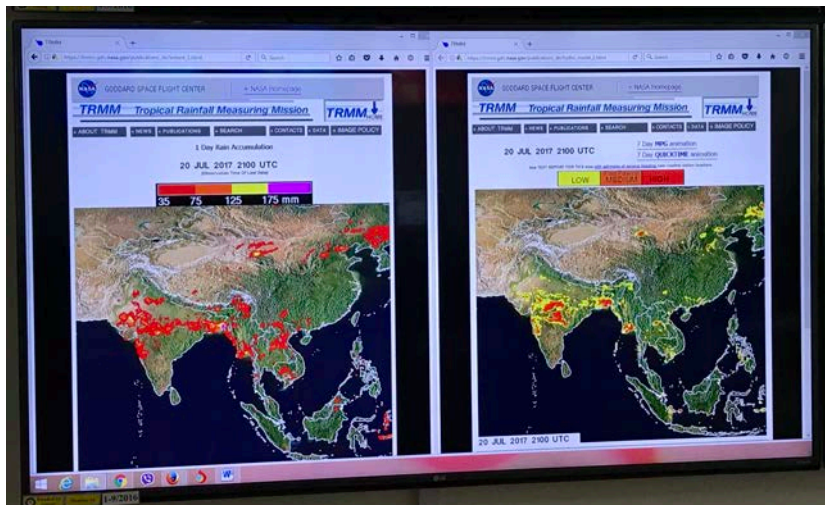

Inter-agency Drone Mission Planning Workshop (MSWRR, MOALI, MAEU, Meteorology and Hydrology, FAO) at the National Emergency Operations Center

Beyond agriculture: utilizing Drone Mapping Technology Across Sectors

The 2017 Monsoon/Cyclone Season

Remember: It is not all about drones!
Other types of data matter also: satellite (photographs, radar), atmospheric weather pseudo observations, ground/station-level weather data, field reports, community-based information

Beyond agriculture: utilizing Drone Mapping Technology Across Sectors

The 2017 Monsoon/Cyclone Season

Data Collection and Information Analysis
Min Ywar Village, Minbu/Saku Township

DDM-MSWRR.
2017.
Thiri Maung,
Min Soe Han.

CONSIDERATIONS FOR INSTITUTIONALIZING DRONE APPLICATIONS FOR DRR IN AGRICULTURE

Keep it practical. Always have contingencies—things will not be perfect

CONSIDERATIONS FOR INSTITUTIONALIZING DRONE APPLICATIONS FOR DRR IN AGRICULTURE

There will always be challenges:

Getting government support or approval

Gaining internal support

Mobilizing resources and justifying the costs (hardware, software, field operations)

'being operational in the field' – logistics, access to field support information, getting local government and other ministerial access clearances, getting drone team members released for field missions (in most cases, they are not full time)

Considerations for Institutionalizing Drone Applications for DRR in Agriculture

1. Technology (type, access, cost, acceptability, maintenance)

Purpose; how accurate/precise do you want to be? ; coverage

2. Regulatory and policy environment

consider all aspects - policies/laws, institutional, technological (anti-drone systems)

3. Safe and lawful use

4. Institutional setup

5. Operations, including mission preparation, implementation and data analysis/dissemination

having your own protocols/systems is important

6. Local/Field level coordination and support

Do not forget to be community-centered

7. High level support/sensitization

8. Sustainability

consider policy, institutional, operational
and technological perspectives