**NASA DEVELOP National Program**

****ICIMOD, Nepal

**Spring 2014**

**ACCESSING CHALLENGES IN PRACTICING AGRICULTURE IN NEPAL AND BHUTAN**

**Using NASA EOS to study lack of water supply and/or irrigation in Bhutan and Nepal**

**Team Lead:**

**Team Members:**

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**Advisors & Mentors:**

Sebastian Wesselman (ICIMOD, Nepal)

Dr. Kenton Ross (NASA)

**Past or Other Contributors:**

Department of Hydrology and Meteorology

Past Interns at ICIMOD (DEVELOP Program)

**Applied Sciences National Applications Addressed:**

Agricultural Potential and risk assessment in National and regional Level

**Study Area:** Nepal and Bhutan

**Study Period:** January 24, 2014 – April 4, 2014

**Community Concerns**

Bhutanese and Nepalese farmers are facing a number of challenges when practicing agriculture, like soil quality, steep slopes, land degradation, issues with wildlife, labor shortage (mainly due to rural – urban migration) and lack of adequate water supply and/or irrigation facilities.

Within this spring term, the issue of water supply will be the central topic of research, trying to find out where problems occur, and how monitoring using Earth Observation can help identify these problems. This could help communities to anticipate, prepare or adapt (e.g. improving irrigation facilities).

**80-100 Word Blurb**

This research is intended to make use of NASA Earth Observation and Monitoring System to apply in issues like climate change, agriculture, livelihood, etc. that concerns general public and government organizations. In this particular research an assessment of irrigation potential and risk of irrigation/water supply for agriculture in Nepal and Bhutan is being carried out based on the data available in NASA EOSDIS and different national governmental organizations.

**Abstract**

Bhutan is largely an agrarian economy with 79 percent of its population engaged in agriculture and livestock farming. As such agriculture is an important source of employment and part of daily life for the Bhutanese people (Tobgay, 2005). Addressing agriculture challenges is crucial for planning decision and policy making as government aims to achieve self-sufficiency in food commodities through domestic production. Moreover, the demand for food is still increasing to meet the food security for a growing population and to provide more nutritious food. The agriculture challenges such as land fragmentation, human wildlife conflict, inadequate irrigational facilities is a growing issues which needs an immediate attention as agricultural growth and productivity remains central to poverty reduction, particularly a country like Bhutan, where a large share of the population relies on agriculture and agri-business for their livelihood. Therefore, this study aims to portray the challenges and strategies of agriculture practices at a micro level.

Nepal is an agricultural country with more than 65 percentage of population still relying on agriculture for livelihood. Agriculture is a main source of income for many people living in the remote parts of Nepal. But agriculture as an occupation is very challenging in context of Nepal because of the topography, climate, and issues with wildlife, lack of inadequate irrigation and water supply, and shortage of labors and resources. Besides the farmers are still using the traditional method for agriculture which is very difficult and time consuming. In addition farmers have to face different natural calamities like flood, landslide, drought, uneven rainfall, acidic rainfall etc. making it even more difficult to sustain in this changing situation. Recent economic survey (2012/13) found out that the annual production of cereals has decreased by 8 percent.

In this context, the Government of Nepal has recently formulated the 20 year Agriculture Development Strategy emphasizing to increase agriculture production to solve the food and nutritional security problems of the country safeguarding the environment. Also, the National Land Use Policy-2069 has been declared, which is focused to increase the productive capacity of land. And Organization’s like ICIMOD are also helping government and people by producing useful data related to land use for proper decision making.

Within this spring term, the issue of water supply will be the central topic of research, trying to find out where problems occur, and how monitoring using Earth Observation can help identify these problems. This could help communities to anticipate, prepare or adapt (e.g. improving irrigation facilities) the changing situations.

**Partners/Collaborators**

ICIMOD,Nepal: Mr. Sebastian Wesselman

Serubtse College,Kanglung,Bhutan: Dr. Pankaj Thapa

NASA SERVIR, Eric Anderson

**Current Management Practices & Policies**

Currently National Land Use Project in Nepal is preparing VDC(Village Development Committee) level Land use maps integrating the whole parameters like Climate, Soil type and its properties, topography, socio-economic data, Land type, water availability etc. No Land use policy is in implementation phase till now but government is planning to prepare a better land use policy and implement in near future. The methods employed to gather the data are very costly and time consuming and mostly based on field observation and study. Some of the parameters like topography, Climate Change, Water availability can be studied using remote sensing and NASA sensors which could guide the policy maker to focus on the most vulnerable areas.

**Benefit to End-User:**

* Government/Policy Makers
* General Public/Farmers

**Decision Support Tools**

* River maps (perennial/non-perennial river)
* Water availability map for agricultural areas
* Agricultural land use maps
* Mobile application to crowd source water availability data
* Story maps

**Earth Observations & Parameters**

TRMM, Precipitation Radar (PR) – Rainfall  
SRTM – DEM

Terra – MODIS / ASTER GDEM

**Future Applicable NASA Missions**

GPM – precipitation measurements

SMAP – soil moisture estimates

**Models Utilized**

N/A

**Ancillary Datasets Utilized**

* Hydrological and Meteorological data, Department of Hydrology and Meteorology, Nepal
* Land use data, ICIMOD
* River networks, ICIMOD

**Software Utilized**

Software package - use/data

Erdas Imagine - land classification of Landsat imagery

ArcGIS - Raster Manipulation/Analysis, Image Enhancement & Map Creation of Landsat ETM+