My Community, Our Earth (MyCOE) SERVIR Global Fellowship Program

Capstone Events — April 2014

Washington, District of Columbia ▪ Tampa, Florida

The MyCOE / SERVIR Capstone Event celebrates a global program carried out over the past two years, with representative student-led projects highlighting how youth around the world are using remote sensing, GIS, GPS, and geospatial data to address climate change issues in their regions. Several outstanding MyCOE / SERVIR Fellows were selected to showcase their work to demonstrate the power of spatial data and geographic thinking. They were nominated by instructors and staff of the MyCOE Program and SERVIR Hubs and chosen by USAID and NASA from among the 120 participants of the 2012-2014 MyCOE / SERVIR Program. These Capstone Fellows hail from ten countries and bring together four staggered regional rounds of 10-month fellowship terms in East Africa, Himalayas, West Africa, and Southeast Asia. In early April of 2014, Fellows meet with USAID and NASA staff, scientists, and others in Washington, DC through symposia and exhibits convened at agency headquarters. They then travel to Tampa, Florida to present their work at a featured illustrated paper session during the Association of American Geographer's Annual Meeting, which draws nearly eight thousand attendees from over sixty countries.

Through their stories and their projects, we are inspired by the power of geographic data and technologies and by the spirit and determination of young people to make a difference in their communities, our Earth.

www.aag.org/mycoe.servir

Our Challenge

Despite the technologies that are increasingly available around the world for application to development objectives, opportunities to access and learn to use them in innovative ways remain rare, especially for emerging scholars in developing regions, and even more so for female students. In particular, we are compelled by the incredible potential for geospatial technologies and the sciences underpinning them to lend innovative frameworks for conceptualizing complex problems and integrating diverse contributions across a wide range of strategic needs. Yet capacity building and research opportunities are lacking for students to learn to use GIS, remote sensing, and GPS as tools for addressing pressing concerns like climate change adaptation, food security, and other environmental issues. Moreover, many programs feature only short-term training in workshops without also providing the long-term mentorship, networking, communication skills, and professional development necessary to transform these young entrepreneurs into scholars who can connect their scientific results to the public and to decision makers.

The MyCOE / SERVIR Global Fellowship Program builds long-term local capacity of young, emerging scholars and practitioners to use geography and geographic technologies for addressing climate change issues across developing regions of the world. More than a series of workshops, the program is purposefully designed to offer an experience that strengthens South-South networking linkages among participants of MyCOE, the SERVIR system, and user communities, particularly future users in Sub-Saharan Africa and Asia.

Over the past two years, from 2012-2014, four regional rounds of the fellowship program have been conducted, with a focus on using geographic technologies to address climate change and key subthemes pertinent to realities in select USAID Mission countries in these regions. Hundreds of applicants were received, and participants were competitively selected on the basis of the potential of their proposed work to use NASA and SERVIR data to conduct a research project, and then reach out to local stakeholders, including communities such as farmers' groups, local decision makers, women producers, school children, and other groups, around these results.

University undergraduate and graduate students and their mentors are provided small research stipends, travel support, expert instruction, mentoring, and SERVIR resources to develop and improve their projects. A launch workshop is held at SERVIR Hubs and collaborator sites in each region. Each workshop includes technical training, fieldwork methods, professional development sessions on topics such as research design and communicating scientific results, and scientific knowledge about climate change, food security, and related themes. Fellows revise their projects and conduct research over a 3 to 6 month period, then carry out an outreach component to share their results with stakeholders. All the while, they are supported by peer-mentoring with Fellows in other countries and MyCOE and AAG mentors, including strong representation of women. One hundred and twenty Fellow and mentor participants in all have taken part and remain active in the MyCOE / SERVIR virtual knowledge community.

MyCOE / SERVIR Projects by Region

REGIONAL ROUNDS	in collaboration with	KEY THEMES	PARTICIPANTS	COUNTRIES
4 Regions	SERVIR HUBS/OTHERS	54 Research and Outreach Projects on Climate Change	120 Total: 68 Fellows (56% female) and 52 Mentors (23% female)	24 countries
East Africa	Regional Center for Mapping of Resources for Development (RCMRD), Kenya	Climate Change, Agriculture, and Food Security	17 teams of 35 individuals; 8 male and 10 female Fellows (17 mentors)	9 countries: DRC, Ethiopia, Kenya, Malawi, Rwanda, South Africa, Sudan, Tanzania, Uganda
Himalayas	International Center for Integrated Mountain Development (RCMRD), Nepal	Climate Change in Mountain Regions	12 teams of 27 individuals; 7 male and 8 female Fellows (12 mentors)	5 countries: Bangladesh, Bhutan, India, Nepal, Pakistan
West Africa	Center for Remote Sensing and Geographic Information Services (CERSGIS) Ghana	Three Generations of Women in Climate Change and Food Security	14 teams of 32 individuals; 8 male and 10 female Fellows (14 mentors)	5 countries: Benin, Cameroon, Cote d'Ivoire, Ghana, Nigeria
Southeast Asia	USAID's Regional Development Mission for Asia (RDMA), Bangkok, Thailand	Climate Change, Landscape and Watersheds	11 teams of 26 individuals; 7 male and 10 female Fellows (9 mentors)	5 countries: Cambodia, Laos, Myanmar, Thailand, Vietnam

Significant Outcomes

- builds long-term capacity in developing regions using Geography/GIS for sustainable development goals
- increases promotion and retention of women in science and innovation
- supports young innovators and scientists building capacity in science based fields
- builds communities of practice including cohorts of young future leaders and current practitioners
- fosters communication among students in different countries, including relationships among US and international colleagues and South-South collaborations
- raises awareness of Geography/GIS contributions toward climate change issues
- incorporates local data and activities into SERVIR initiatives, and vice-versa, and with other broader regional or global efforts, indicators, and programs
- leads to specific local level results emanating from the actual team projects, insights, results and innovations
- enables collection examples of excellence showcasing and demonstrating the value of existing programs (including SERVIR) offering geographic data and tools for sustainable development, climate change, food security, and other highly relevant challenges in developing regions
- grows institutional capacity and enhances strategic partnerships among universities, government entities, and NGOs within and among the countries engaged.

A Public-Private Partnership

The MyCOE / SERVIR Partnership Program supports long term local capacity to use geography and geographic technologies for sustainable development initiatives and facilitates ways in which existing geographic data and tools may be applied to critical regional needs across developing regions of the world. The partnership strengthens the linkages among MyCOE, the SERVIR system, and user communities, particularly new and future users in Sub-Saharan Africa and Asia.

SERVIR is a joint venture between NASA and the U.S. Agency for International Development (USAID) that provides satellite-based Earth observation data and science applications to help developing nations in Central America, East Africa, and the Himalayas improve their environmental decision-making. SERVIR—an acronym meaning "to serve" in Spanish—provides this critical information to help countries assess environmental threats and respond to and assess damage from natural disasters. To further advance SERVIR's commitment to operate "from space to village," NASA and USAID signed a joint MOU in 2011. This agreement expanded their joint efforts to overcome international development challenges such as food security, climate change, and energy and environmental management.

MyCOE (My Community Our Earth: Geographic Learning for Sustainable Development) is a U.S. Type II Public-Private Partnership established in 2001 in conjunction with the United Nations World Summit for Sustainable Development in Johannesburg. It provides geographic perspectives, learning resources, and technological tools to encourage youth to engage with their local communities around global sustainability themes. The Association of American Geographers (AAG) has founded and served as the MyCOE Secretariat since its inception, collaborating with international academic organizations, government and nonprofit agencies, and private firms to further the advancement of geographic learning for sustainable development. AAG is a scientific and educational society with more than 11,000 members from more 60+ countries. Another active partner in this program is founding partner Esri, a worldwide leading international supplier of Geographic Information System (GIS) software, web GIS, and geodatabase management applications. Esri donated year-long licenses to ArcGIS and Spatial Analyst to all MyCOE / SERVIR Fellows.

www.aag.org/mycoe.servir

https://sites.google.com/a/aag.org/mycoe-servirglobal/

www.servirglobal.net/MyCOEOpportunities.aspx

Climate Change, Agriculture, and Food Security

Fellowship launch, capacity building and professional development workshop held at Regional Center for Mapping of Resources for Development (RCMRD) headquarters in Nairobi, Kenya, December 9-19, 2012. Fieldwork with The Greenbelt Movement.

Sebele Dejene Tefera Scales Up the Importance of a Local Forest by Showing Global Carbon Value

"Before I became a MyCOE / SERVIR Fellow, I was thinking at the local level, but being chosen as a Fellow has increased my confidence so that now I feel that I can contribute something at the global level."

"Drought and famine coupled with other socio-economic and environmental problems for more than three decades have resulted in chronic problems in the life style of the population [of Ethiopia]," says Sebele. Passionate about becoming a scientist and professor, Sebele aspires to make significant contributions on the issue of global climate change and its effects, particularly drought and famine in developing countries. She notes that even though the effects of climate change and vulnerability are worldwide problems, they have a paramount impact in developing countries like Ethiopia.

Sebele was very eager to participate in the MyCOE / SERVIR Program because of its focus on young professionals and students like herself. She notes how unusual it is to "trust and expect to be [achieving] this kind of goal by young professionals like me." She says the program is helping her perform effective research and acquire knowledge and experience in the international realm.

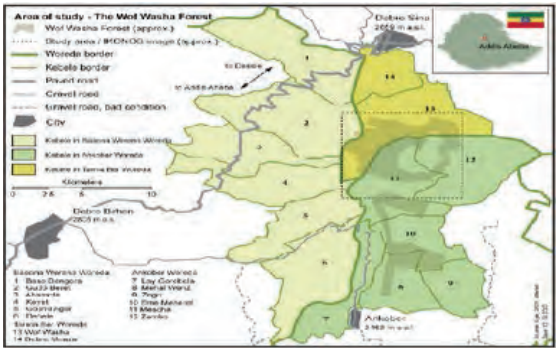
The international importance of Sebele's local study site, Wof-Washa forest, is one she has worked to calculate. As one of the very few remaining natural forests in Ethiopia, it plays an important role in the country's potential contribution to global carbon balance. As both carbon source and sink, it could form an important component in efforts to combat global climate change, and in turn, to mitigate its local effects.

Carbon Stock Estimation in Wof-Washa Natural Forest: Potential for Carbon Finance Options and Climate Change Mitigation

With the help of remote sensing and GIS techniques and software, Sebele's study analyzed the conditions and land cover pattern of Wof-Washa forest, from past to present. The methodology used to estimate the total carbon stock was a standard step-by-step procedure using carbon inventory principles and techniques, an accounting based on data collection and analysis of carbon accumulating in the above-ground biomass, below-ground biomass, litter, dead wood, and soil carbon of forests. Aerial images of the years 1957 and 1994 and an IKONOS satellite image of 2005 informed the estimation. The above-ground carbon and soil organic carbon in the present study forest was higher than most tropical dry forests and within the range of tropical rain forests. This implies the significance of Wof-Washa Natural Forest of Ethiopia in the global carbon trade and thus climate change mitigation. Carbon sequestration benefits will be perceived to be more important at the global level than at national or local levels, so this research points up the importance of protecting this site.

Sebele (*opposite and above*) collects field data for her project.

Sebele is working on a Master's Degree in Environmental Sciences with a specialization in Atmosphere, Energy, and Climate Change. She plans to also pursue a PhD and continue to participate in international and interdisciplinary research. ■



Map of Wof-Washa National Forest.

Susan Malaso Kotikot Overcomes Obstacles with Determination and Knowledge

"I was encouraged to work hard in school by my parents as they insisted it was the only thing my siblings and I could inherit from them... Looking back, I can only count myself blessed that I have an education and countless opportunities MyCOE / SERVIR has revealed that I can explore for improving livelihoods. It will be my joy to use this knowledge in the near future to solve problems in my own home country."

Born into the Maasai community at Sintakara Village, Narok County, in Kenya's Rift Valley Province, Susan Malaso Kotikot spent her childhood facing many challenges. Traditionally, Maasai women raise the children, tend the cattle, and do not, in general, enjoy the same privileges as Maasai men. Few Maasai women receive an education. Susan, however, excelled in school, has an undergraduate degree in Environmental Planning and Management from Kenyatta University, and is in pursuit of a Master's degree specializing in geospatial technologies.

Her goal in life is to be in position to influence people's lives positively and to help develop the potential within the youth in her community through research in geospatial applications. She seeks to acquire the technical capacity that will enable her to influence action and policy.

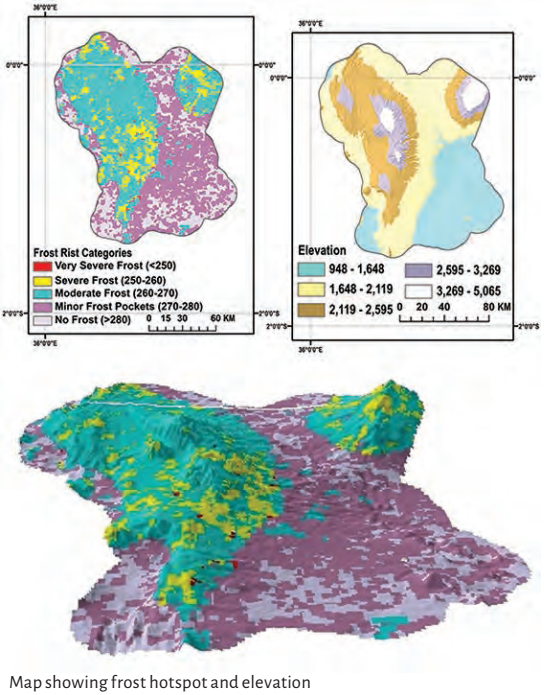
Susan calls her selection as a MyCOE / SERVIR fellow "a breakthrough." "With the many environmental issues related to climate change rocking my country and local community, I am limited in my ability to influence significant action towards alleviating problems of farmers and pastoralists. More technical capacity is of the essence. Fellowship into MyCOE came to me as an opportunity towards achieving my goal." Susan's resulting project won an Esri award at a regional Education User Conference.

Due to frost risk, farmers in the region often use greenhouses for cultivation of fruits and vegetables.

Application of GIS and RS Techniques in Frost Risk Mapping for Mitigating Agricultural Losses

Her project demonstrated the role satellite imagery technologies can play in frost risk mapping. Frost is a perennial agricultural hazard within the Aberdares and Mt. Kenya regions and sometimes causes crop damage leading to huge agricultural losses. Malaso's research mapped frost "hotspots" within the Aberdare and Mt. Kenya regions and identified the extent of arable land at risk of frost damage as a basis to establish the implication of frost occurrence on food security and economic growth.

Her work established minimum temperature trends between 2000 to 2013 extracted from monthly MODIS LST datasets. Time series analysis indicated recurrent patterns in April, May, July, August, and November, influenced by elevation, land surface convexity, aspect, and rainfall, among other factors.



Map showing frost hotspot and elevation

"The frost hotspot maps can be useful to farmers in scheduling planting, choosing crops, and selecting crop sites, helping them avoid frost-prone times and locations for planting," Susan explains. "The end result is better crop yields." Her results support recommendations for the adoption of resilient crop cultivars, use of manual protective measures including sprinkler irrigation, wind induction, and use of greenhouses based on growth durations, as well as planting site selection based on crop susceptibility and land surface curvature.

MyCOE / SERVIR, she explains, enabled her to witness and appreciate the potential of GIS and remote sensing in solving environmental concerns related to climate change and spatial planning. She says, "I am always looking forward to new challenges and experiences in life. This is because I believe that they offer me an opportunity to grow, and more importantly give me a chance to influence someone's life positively. I am certain that after this Capstone event, my mind will be propelled to higher dimensions." ■

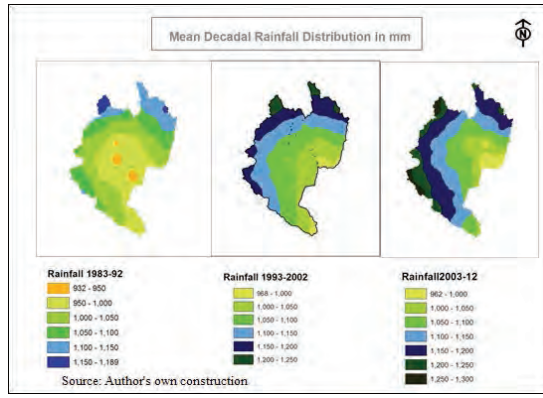
Tsedenya Abebe Mengiste Asks 'What if,' and Compels Better Data, More Data Sharing

"The MyCOE / SERVIR workshop helped me focus and structure my proposal and made me aware of how to use Earth observation data in my research on flood frequency mapping for climate change adaptation in my country."

When the Earth shook in Port-au-Prince, more than seven thousand miles away, Tsedenya took note. The devastating aftermath of the 2010 quake in Haiti made her ask herself, "What if this had happened in my country?" She was inspired to turn her focus on Disaster Risk Management, and began studying for her Master's degree in Geography and Environmental Studies with a specialization in Climate Change and Adaptation. Tsedenya wants to position herself to help her country when environmental disasters do occur, and she desires "to make a difference in society and the world" by using her skills and knowledge.

Tsedenya notes that "opportunities in the third world are limited and challenges are complicated." She worked to support herself financially and cover her educational costs for her first degree and has enrolled in night school to earn her second degree.

Tsedenya called the MyCOE / SERVIR Fellowship experience "the best thing that has happened" during her school career. She attributes excellent marks on her thesis work to the skills and resources she received from the program. "MyCOE / SERVIR has helped me to stay in this course and keep me moving, so I am closer than ever to achieving my goal," she says.



Mean Decadal Rainfall Distribution created by Tsedenya for her study site.

Assessment of Flood Frequency and Local Adaptation Practices in Dilu-Meda, Upper Awash, Ethiopia

Her work received more attention than just good grades, thanks to her efforts at reaching out to stakeholders. The purpose of her study was to provide flood frequency analysis, taking into consideration both land use/land cover change and climate change/vulnerability to flood risk. Conducted along the Upper Awash River, her research showed that average yearly minimum temperature and rainfall have increased significantly while conversion of shrub and grasslands to farmland also rose sharply. Tsedenya conducted fieldwork in the floodplain communities to gather insights into local flood adaptation practices, finding that farmers are adopting crop diversification and also altering timing of plowing and sowing and preparation of the plots. More importantly, she found that responses vary according to gender as well as by the magnitude of the floods.

Tsedenya collects socio-economic data from informants.

However, Tsedenya is asking for more than the current external intervention that "has merely been done to support the local adaptation practices and optimize crop production to develop their coping capacity to the future climate risk." To compel different actors to implement adaptation policies and strategies, she submitted her results to the National Meteorological Agency, Disaster Risk Management and Food Security Sector and Sebeta Hawas Agriculture Bureau, asking for improved quality of data and ways of keeping clear, publicly available records. She reports they have reached mutual understanding of the need to increase the number of data collecting stations. She also held briefings with officials who are considering the future climate change impacts and risks on the study area.

Tsedenya describes her aspirations with eloquence: “My dream is to fulfill my purpose — contribute my part to this world. I want to proudly answer myself that I have done my share with a smile. In a mean time, I want to live the best out of whatever life brings to me.” ■

“Fieldwork on the floodplain has provided a good insight into the benefits of flood and local adaptation practices. Crop diversification, timing of plowing and sowing and preparation of the plots are strategies farmers employed to adapt to the seasonal flooding variation based on their experiences. Inhabitants have also developed a range of practical knowledge on how to adapt to the flooding impacts on their social, economic and health situations.”

All MyCOE / SERVIR Teams and Projects from East Africa

DEMOCRATIC REPUBLIC OF CONGO

FELLOW: **Jethro Baruka** (University of Kisangani), **MENTOR:** **Kalinde Riziki** (University of Kasugho); *"Application of GIS Tools in Understanding and Decision Making to Cope with Climate Change in the East of DR Congo"*

ETHIOPIA

FELLOW: **Sebele Dejene Tefera** (Addis Ababa University), **MENTOR:** **Teshome Soromessa** (Addis Ababa University); *"Carbon Stock Estimation in Wof-Washa Natural Forest: Potential for Carbon Finance Options and Climate Mitigation"*

FELLOW: **Tsedenya Abebe Mengiste** (Addis Ababa University), **MENTOR:** **Bernard Majani;** *"Assessment of Flood Frequency and Local Adaptation in Dilu Meda, Upper Awash, Ethiopia"*

FELLOW: **Emebet Bekele** (Addis Ababa University), **MENTOR:** **Mickias Woldesellassie;** *"The Vulnerability of Smallholder Agriculture to Climate Variability/Change in Boset Woreda, Oromia Region, Ethiopia"*

KENYA

FELLOW: **Pascal Thoya** (Pwani University College), **MENTORS:** **Joseph Maina** (Wildlife Conservation Society-Mombasa) and Fred Mokua (RCRMD); *"Sea grass Mapping using Medium Resolution Imagery along the Kenyan Coast"*

FELLOW: **Sarah Achola** (University of Nairobi), **MENTORS:** **Faith Karanja** (International Centre of Insect Physiology and Ecology) and **Tino Petri** (International Centre of Insect Physiology and Ecology); *"Use of Participatory GIS in the Viability Assessment of Available Climate Change Adaptation Strategies in the Taita Hills, Kenya"*

FELLOW: **Charles Mwangi** (Jomo Kenyatta University), **MENTOR:** **Charles Mundia** (Jomo Kenyatta University); *"Crop Condition Monitoring and Yield Estimation for Food Security: Case Study of Maize in Nyandarua Country Central Kenya"*

FELLOW: **Susan Malaso Kotikot** (Kenyatta University), **MENTOR:** **Simon Onywere** (Kenyatta University); *"Application of GIS and RS Techniques in Frost Risk Mapping for Mitigating Agricultural Losses"*

FELLOW: **Kaleb Adamba** (Masinde Muliro University), **MENTOR:** **Harrison Mugatsi** (Masinde Muliro University); *"Analysis of Trends and Impacts of Land Use and Land Cover Changes on Dominant Canopy Trees Diversity of Kakamega"*

MALAWI

FELLOW: **Violet Moyo** (Chancellor College), **MENTOR:** **Mathews Tsirizeni** (Chancellor College); *"An Assessment of Land Use/Land Cover Change Between 1990 to 2010 in Nkhotakota District, Malawi"*

All MyCOE / SERVIR Teams and Projects from East Africa (continued)

RWANDA

FELLOW: Steve Shema (National University of Rwanda), **MENTOR: Gaspard Rwanyiziri;** "*Spatial-Temporal Analysis of Crop Development in Wetland Zones. The Case of Lakes Cyohoha North and South in Bugesera District, Rwanda*"

SOUTH AFRICA

FELLOW: Sonwabo Mazinyo (University of Fort Hare), **MENTOR: Leocadia Zhou** (University of Fort Hare); "*Risk and Vulnerability Assessment of Food Security to Climate Variability and Change: Livelihood Dynamics of Rural and Peri-Urban Communities and Adaptive Strategies to Mitigate Climatic Stresses in the Ngqushwa Local Municipality – Eastern Cape, South Africa*"

FELLOW: Natalie Ellis (Rhodes University), **MENTOR: Roderick Fox** (Rhodes University); "*Land use change in the Thina catchment, South Africa*"

SUDAN

FELLOW: Hatim Elamin (University of Kordofan), **MENTOR: Hassan Elnour Adam** (University of Kordofan); "*Development of Above-Ground Biomass for Acacia Senegal Tree Using Satellites Imageries Case of North Kordofan Gum Belt, Sudan*"

TANZANIA

FELLOW: Digna Mlengule (University of Dar Es Salaam), **MENTOR: Opportuna Kweka** (University of Dar Es Salaam); "*Assessment of Effectiveness of Farmers Adaptation Strategies to Change for Crop Production in Ludewa District, Tanzania Climate*"

UGANDA

FELLOW: Barasa Bernard (Nelson Mandela Metropolitan University), **MENTOR: Vincent Kakembo** (Nelson Mandela Metropolitan University); "*The impact of land use/cover change on soil organic carbon and its implication on food security and climate change vulnerability on the slopes of Mt. Elgon, Eastern Uganda*"

FELLOWS: Grace Nakawooya (Makerere University) and **Immaculate Asiimwe** (Makerere University), **MENTORS: Frank Mugagga** (Makerere University) and **Karl Tiller** (Makerere University); "*Enhancement of Early Warning Systems for Sustainable Food Security in Acholi Region, Uganda*"

Climate Change in Mountain Regions

Fellowship launch, capacity building and professional development workshop held at the International Centre for Integrated Mountain Development (ICIMOD) headquarters in Kathmandu, Nepal, February 17-27, 2013.

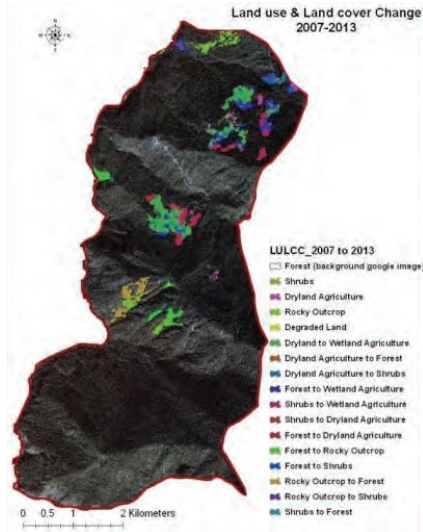
ICIMOD

Lhakpa Weaves Together Research and Teaching to Engage Neglected Indigenous Perspectives

"My participation in the MyCOE / SERVIR Program has really taken me some steps ahead. It has fostered a richer insight about research besides giving me an opportunity to tackle real field-related problems."

A former primary school geography teacher for more than six years, Lhakpa now pursues a Master's Degree in Sustainable Development at the Royal University of Bhutan. He brings his experience at the head of the classroom to his studies of communities who are threatened by climate change, to ensure that he "makes relevant contributions to serve the changing needs of the times, especially related to environmental issues and development."

Lhakpa, as he is simply called, is far from a simple thinker. He has been able to smoothly engage the complex and sometimes contradictory subject of how scientists can reconcile religious belief systems with environmental knowledge in order to engage communities in mitigating the effects of climate change. What happens when we compare remotely sensed land cover data to the ways of knowing by traditional people on the ground?



Linking Traditional Beliefs on Climate Change Phenomena to Scientific Facts for Better Adaptation Strategies - A Village Level Case Study in Eastern Bhutan

Lhakpa's research examined indigenous beliefs on climate change and linked them to scientific understanding. Questionnaires, interviews, and field observation methods were used to understand perceptions and beliefs about climate change. His case study showed how farmers in Dragrong village face phenomenon of abrupt and abnormal weather conditions steered by global climate change. Irregularities in temperature and rainfall, changes in land use and land cover visible through satellite imagery, and existing literature clearly indicate that climatic conditions are changing in this part of the world, especially in recent years. Indigenous knowledge and traditional beliefs validate these facts, evidenced by the intensified practice of *Chorbu*, a rain calling ritual, which now needs to be performed almost every year and sometimes twice a year, due to abnormal weather conditions. In these practices, spiritual sacraments and prayers are offered to appease the local deities during rainfall delay or absence, crop failure, poor harvest, disease and pests, and occurrence of natural disasters. The most challenging task ahead is for researchers, planners, policy makers, stakeholders, and the media to extend climate change research, awareness, and mitigation measures in ways appropriate to the spiritual reasoning of local communities to evolve adaptation strategies appropriate to the lifestyle and livelihood of local people.

Top: My mentor (*center*) with the village priest (*right*) who shared valuable information about traditional beliefs.

Second: School students collect water, which is the most serious concern for the communities.

Third: The steep, stony and dry agriculture land and women's involvement indicates the hardship, which is further aggravated by climate change.

Bottom: Interview with the elderly communities — the source for past climatic conditions and local knowledge.

Calling his participation in the MyCOE / SERVIR Program a "significant milestone" in his development as a researcher, Lhakpa exudes an enthusiasm for many ways of knowing and doing. When not teaching or studying, he enjoys nature-watching, archery, and religious chores. He has an avid interest in photography, which he believes could aid his future research. He notes that the geography lecturers of his undergraduate days inspired his interest in studying environmental issues and gives credit to his own mentors and teachers, from his university and from MyCOE / SERVIR, for increasing his "long-term potential to contribute to research." ■

Prasamsa Thapa Is on Top of the World, Doing Fieldwork at the "Rooftop of the World."

"MyCOE / SERVIR has inspired me and given me a huge opportunity to explore more in the field of GIS and remote sensing. I always wanted to do extensive field work for my research, and this program helped me to achieve that dream."

Born and raised in the Himalayas, Prasamsa calls herself "an adventure loving girl from Nepal." She enjoys exploring new places and meeting new people, trekking, swimming, dancing, and listening to music. Between these adventures, she has found time to complete her Bachelor's degree with Honors in Environmental Science at Kathmandu University, Dhulikhel, Nepal.

Prasamsa's goal is to become an environmentalist and work on climate issues, contributing to society by developing new ideas and concepts. She calls her selection as a fellow in the MyCOE / SERVIR Program "one of the major events" of her life. The MyCOE / SERVIR workshop, she says, provided her with many tools and techniques that helped significantly in her research. "Being in one of the poorest countries in the world with such a limited exposure, it is very hard to get these kinds of opportunities for a girl like me. With the help of MyCOE / SERVIR, I was even able to go for an adventurous trek on one of the most vulnerable glacial lake of Nepal at the altitude of 4850 meters above sea level."

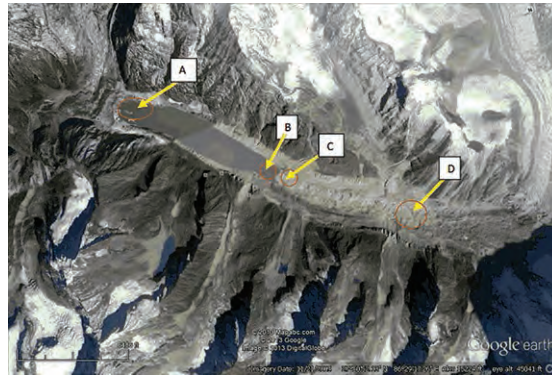


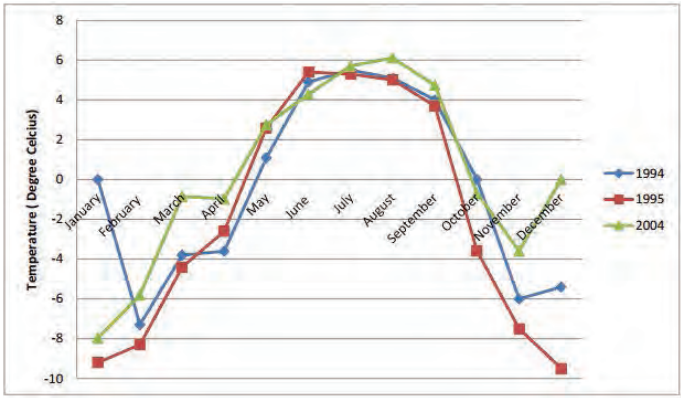
Image of Tsho Ralpa Glacial Lake and Trakarding Glacier showing the points of surface temperature measurment via remote sensing.

Surface Area Variation and Climatology of Tsho Rolpa Glacial Lake using Remote Sensing and GIS, Dolakha District, Nepal

Recession of the Trakarding Glacier has been the reason for the formation and expansion of Tsho Rolpa Glacial Lake in Rolwaling Valley in northern Nepal. Many researchers have attributed the glacial lake formation and expansion to climate change. Prasamsa set out to discover the dimensions of this change because the rapid expansion of glacial lakes can trigger Glacial Lake Outburst Flooding. Thanks to satellite imagery provided by the SERVIR Hub hosted at the International Center for Integrated Mountain Development (ICIMOD), she used Remote Sensing and GIS techniques to calculate the area of Tsho Rolpa Glacial Lake and the length of Trakarding Glacier from 1975 to 2012. She found that the lake has undergone rapid expansion over the past three decades, corresponding to the retreat of the glacier. While the lake doubled in area, the length of the glacier shrunk by 20 percent. Increase in surface temperature has played a major role, rising for both lake and glacier from 1992 to 2012. Prasasma also found data to show slight increases in atmospheric temperature, precipitation, and humidity in 2004 compared to 1994. Her findings confirm that Tsho Rolpa Glacial Lake is considered as potentially dangerous and can cause disaster if outburst flooding occurs.

Prasamsa takes GPS points to code field data.

Prasamsa seeks to share these results with other researchers around the world. When she received news of her selection to represent her region as a MyCOE / SERVIR Capstone Fellow, she was thrilled, saying, "I feel like I am on top of the world." ■



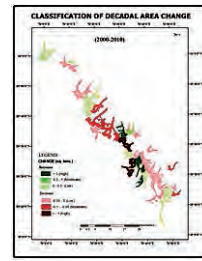
Air temperature of Tsho Rolpa for 1994, 1995 and 2004.

Joyeeta Poddar Uses Imagination, Imagery To Understand Glaciers' Response to Climate Change

"As a woman, I feel honored and privileged to be working in the elusive field of Cryosphere. It indeed fills me with a sense of thrill and achievement! As a Geographer, It was a dream come true for me to get an opportunity to work with AAG!"

As a young girl, Joyeeta listened with fascination to the tales of her grandmother, an excellent story-teller who often told her about places she had visited herself as a young girl. "My mind wandered off to those faraway places where her stories would take me," says Joyeeta. "They imbued my heart with a sense of adventure!" Her grandmother also brought her close to nature and taught her to appreciate its boundless beauty.

Another strong influence on Joyeeta was her father, who gave her the mantra, "to strive to seek to find and not to yield." Joyeeta, who evidently lives by this mantra, aspires to make meaningful contributions towards the advancement of scientific knowledge and understanding of glaciers.



Classification of Decadal Area Change of the glacier, 2000-2010.

When she learned of the MyCOE / SERVIR Fellowship Program, Joyeeta was attracted by the opportunities it offered and by its themes, which suited her area of research. But she "didn't have the slightest inkling back then that the entire experience would be so enriching and rewarding." She calls the program experience "a defining event" in her life.

"MyCOE / SERVIR broadened my horizons, enhanced my academic credibility as a researcher, and made me all the more perceptive towards the crucial role that glaciers play as indicators of climate change and the geospatial technologies that can be used to monitor them. The program deepened my interest in glaciology to the extent that I have now earnestly taken it up as a profession. I live and work high up in the Himalayas and have lent myself to the mountains to shape me up mentally, emotionally, and physically."

Joyeeta now holds a Master of Arts in Geography from Jamia Millia Islamia in New Delhi, and a Master of Technology in Remote Sensing from Birla Institute of Technology, in Mesra, Jharkhand.

Assessment of Glacier Health as a Response to Climate Change in Western Himalayas

Glaciers in the eastern and central region of the Himalayas are retreating rapidly. Joyeeta's research investigates whether the glaciers of the Western Himalayas are showing the same retreating trend as glaciers in other parts of the world. Glaciers respond to signals of climate change either by decreasing or increasing their total mass. Debris coverage has been identified as an important contributor to Himalayan Glaciers' advance and retreat. While monitoring glacier health, Joyeeta focused on automated extraction and accurate mapping of debris cover using satellite images and advanced digital image processing techniques. Snout and area change, land cover change, and thickness changes — the three major parameters indicating the impact of climate change on glaciers — were also monitored, measured, modeled, and mapped for Zanskar Valley, Ladakh in Western Himalayas to determine the response of the glaciers to climate change in the region.

Imagery for the research included False Colour Composite (5-4-3), Shortwave Infrared Composite (4-5-6) and Infrared Composite where glacier landforms are seen clearly.

Joyeeta says that working in the area of cryosphere has emboldened her. "It has drawn me inside out. All my introversion has melted away into oblivion and I have developed a taste for wildness. I am living a life out of the pages of my books. It is my dream, my passion, my goal to be the spearhead and delve deeper into this fascinating field, cultivating it intensively and making meaningful contributions in glacier research." ■

Pramila Paudyal Enriches Understanding of Environmental Poverty and Vulnerability to Climate Change

"Our people and the entire country are highly vulnerable to the effects of environmental degradation as many people are ill-equipped to adapt to the adverse situation. I want to be involved in important research to find causes and effects and discover mitigation measures that are useful to our people and country."

Those expected to be most affected by climate change may be those least able to adapt to and mitigate it. Pramila is pursuing her Master's degree in Environmental Science to research the impacts of a degraded environment on the people of developing countries like her home country of Nepal. She is especially concerned about how a changing climate affects people's livelihoods.

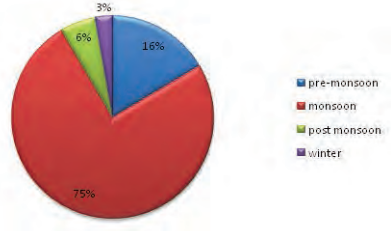
Through visits to several remote villages in Nepalese districts, she gained practical knowledge about what she describes as "the vulnerable situation of rural areas in terms of environment and poverty." Pramila applied for the MyCOE / SERVIR fellowship because of the opportunities it provides for gaining international exposure, improving her research capabilities, and building her capacity to understand the root causes of environmental impacts on the people of Nepal.

Pramila calls MyCOE / SERVIR "a turning point" in her career. "MyCOE / SERVIR provided an international platform for presenting the problems of my country and the impacts that are created due to environmental degradation. I was able to present the vulnerability of the mountainous region to climate change. This program also provided international exposure to great scholarly people who work in the environmental sector."

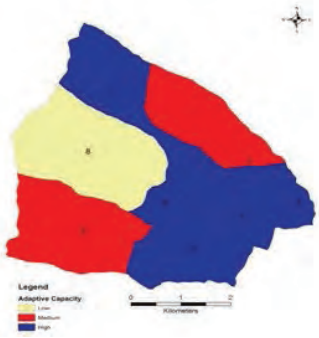
Pramila conducts household questionnaires with local people in the study area.

Climate Change Vulnerability in Mountain Agriculture: A Case Study of Susma Chhemawati Village Development Committee, Dolakha District

The Susma Chhemwati Village Development Committee, a mountainous district, proved to be an engaging case study for Pramila to explore climate change vulnerability. The methodological tool she applied was a community-based vulnerability and capacity assessment approach that included focus group discussions, key informant interviews, Participatory Rural Appraisal methods, and household surveys. Vulnerability map preparation relied upon spatially referencing the data and analysis with GIS tools. Climatological data shows that average annual rainfall was decreasing at the rate of 0.35 mm/year, while average maximum and minimum temperatures were increasing at 0.020°C per year. Pramila found that the climatic condition perceived by people in the area matched the climatic data. People observed increasingly hot days followed by erratic monsoon and changes in timing of rainfall, as well as increase in flooding and landslides in the area. People also reported decreased agricultural crop production with low quality production. Introduction of various pests and diseases was causing damage in the agricultural fields.



Seasonal distribution of precipitation.



Map of the community's adaptive capacity, low (yellow), medium (red), and high (blue), as created through the Participatory Rural Appraisal.

Pramila noted that the SERVIR Hub at ICIMOD provided an excellent opportunity to enhance effective application of GIS software in her research. Suggestions from the MyCOE / SERVIR experts were valuable for refining the report and methodologies, and the support for improving her presentation enhanced her ability to reach out to the study community. The results shed light on real and perceived impacts of climate change in this area, and were discussed with the chief of the District Agriculture Development Office. Her report has become a strong entry point for formulating a community adaptation plan in Dolakha. ■

All MyCOE / SERVIR Teams and Projects from Himalayas

BANGLADESH

FELLOW: **Jannatul Naim** (Rajshahi University), **MENTOR:** Shamsul Alam (Rajshahi University); *"Women's Health, Vulnerability and Adaptation Due to Climate Change: A Study of the Hilly Regions of Bangladesh"*

FELLOW: **Yiaser Arafat** Rubel (Bangladesh University of Engineering and Technology), **MENTOR:** Bayes Ahmed (IMC Worldwide-Bangladesh Office); *"Understanding the Issues Involved in Urban Landslide Vulnerability in Chittagong Metropolitan Area, Bangladesh"*

BHUTAN

FELLOW: **Lhakpa (Royal** University of Bhutan), **MENTOR:** Pankaj Thapa (Royal University of Bhutan); *"Linking Traditional Beliefs on Climate Change to Scientific Understanding: A Case Study in Eastern Bhutan"*

INDIA

FELLOWS: **Antara** Dasgupta and Urvi Lakhera (Doon University, Dehradun), **MENTOR:** Suneet Naithani (Doon University, Dehradun); *"Spatial and Temporal Variations in Precipitation and their Impacts on the Doonagiri Glacier and its Adjoining Habitats Uttarakhand, India"*

FELLOW: **Joyeeta Poddar** (Birla Institute of Technology), **MENTOR:** Arvind Pandey (Birla Institute of Technology); *"Assessment of Glacier Health as a Response to Climate Change in Western Himalayas"*

FELLOW: **Ram Nagesh** Prasad (Jawaharlal Nehru University), **MENTOR:** Padmini Pani (Jawaharlal Nehru University); *"Dynamics of Apple Orchards in Response to Environmental Change: A Case Study of Kullu Valley, Himachal Pradesh"*

NEPAL

FELLOWS: **Anil** Nepal and Nirmal Kumar Shahi (Kathmandu University), **MENTOR:** Kundan Lal Shrestha (Kathmandu University); *"Assessment of the Effect of Climate Change on Extreme Flooding Events in Tamor Basin, Nepal"*

FELLOW: **Gunjan Silwal** (Tribhuvan University), Mentors: Susmita Dhakal (Tribhuvan University), Gyan Kumar Chhipi (Tribhuvan University); *"Modeling Snow and Glacier Melt Runoff And Impacts of Climate Change: A case study of Dudhkoshi River Basin"*

FELLOW: **Pramila Paudyal** (Tribhuvan University), **MENTOR:** Deepak Rijal (Nepal Climate Change Support Programme); *"Climate Change Vulnerability of Mountain Agriculture: A Case Study of Susma Chhemawati VDC, Dolkaha District"*

FELLOW: **Prasamsa Thapa** (Kathmandu University), **MENTOR:** Rijan Kayastha (Kathmandu University); *"Surface Area Variation and Climatology of Tsho Rolpa Glacial Lake Using Remote Sensing and GIS, Dolakha District, Nepal"*

PAKISTAN

FELLOW: **Saad ul** Haque (Institute of Space Technology), **MENTOR:** Badar Ghauri (Institute of Space Technology); *"Drought Monitoring in Barani (Rain fed) Area of Northern Pakistan"*

FELLOW: **Zeenat Yasmeen** (Institute of Space Technology), Mohammad Danish Siddiqui (Institute of Space Technology), **MENTOR:** Arjumand Zaidi (Institute of Space Technology); *"Vulnerability Assessment for Potential Glacial Lakes Outburst Floods (GLOFs) Events in Passu and Bagrot Valley at Karakorum Mountain Range, Pakistan"*

Women in Climate Change and Food Security

Fellowship launch, capacity building and professional development workshop held at the Center for Remote Sensing and Geographic Information Services (CERSGIS) headquarters in Accra, Ghana, July 21-31, 2013. Fieldwork with The University of Cape Coast.

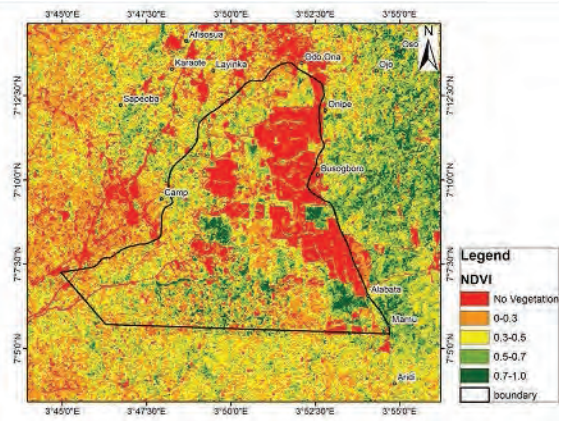
CERSGIS

Wasiu Alimi Works Across Generations, Across Sectors, and Across Disciplines

"MyCOE / SERVIR has influenced my direction. For a science guy like me, blending Geography into my career was a big deal. But that changed after the MyCOE / SERVIR training in Accra, Ghana. Now I see myself as a Geographer for climate change."

From an undergraduate major in Environmental Botany and Palynology, Wasiu has grown to embrace GIS and Geography as a graduate student. He aspires to become an environmental consultant and contribute knowledge, experience, and expertise to issues of environmental development and sustainability. "I believe as an individual that our wellbeing on Earth depends on the health and productivity of our landscape," says Wasiu. "It is our responsibility to make this environment better for the next generations."

Taking that responsibility seriously, he has been actively involved in environmental activities during his academic career, working with various organizations and NGOs while studying. His most recent engagement was with Nature Protection and Environmental Improvement Initiatives, Lagos State and as a volunteer for the National Youth Service Corp Millennium Development Goals engaging upper primary school and lower secondary school children in activities that ensure environmental sustainability. His multi-disciplinary attention to climate change work spans from boys and girls, to young women, to senior female community members.



Normalized Difference Vegetation Index Map of Onigambari Forest Reserve prepared by Wasiu for use in his change analysis of logging activity.

Assessment of the Climatic and Socio-Economic Impacts of Illegal Logging in a Rainforest: The Role of Women

Climate change does not affect everyone in the same way. Men and women are affected and respond differently, especially when it comes to safeguarding their food security and livelihoods. The central goal of Wasiu's research project was to investigate women's participation in climate change and food security by providing relevant spatial information on logging activities in Onigambari Forest Reserve and its surrounding communities. The first objective was to investigate the climatic impact of illegal logging using four climatic variables: rainfall, vegetation, carbon dioxide, and temperature. Decadal analyses were carried out using Landsat imageries for four periodic years: 1981, 1990, 2000, and 2011. Change detection mapping and zonal statistics methods helped Wasiu investigate relationships among these climatic variables and forest logging. Results show over-exploitation of trees leading to abnormal microclimatic occurrences. His second objective focused on women's participation in logging activities. Eight communities surrounding the forest reserve were surveyed and interviewed using a structured questionnaire to capture women's understandings and perspectives. Wasiu reached out to forestry officers, service corp members, young women, and older adult women. Results show that illegal logging still operates in the area despite a government ban on exploitation since 2011. He also found that older women seem to know more about illegal logging and government laws than their younger counterparts, who on the other hands are more aware of climate change. Wasiu concludes that there is an urgent need to ensure that women are included in climate change mitigation and adaptation activities and strategies designed to enhance food security and livelihoods.

Interviews of women in households at the Busogboro area of Onigambari.

Wasiu aspires to one day establish an NGO or a business that would empower people and reduce unemployment in his country through research, networking, and entrepreneurship. ■

Roseline Njih Egra Batcha Follows in Her Father's Footsteps

"MyCOE / SERVIR not only provided me with GIS skills, but helped me improve on public speaking and organizational management, and gave me a virtual space for networking with like minds."

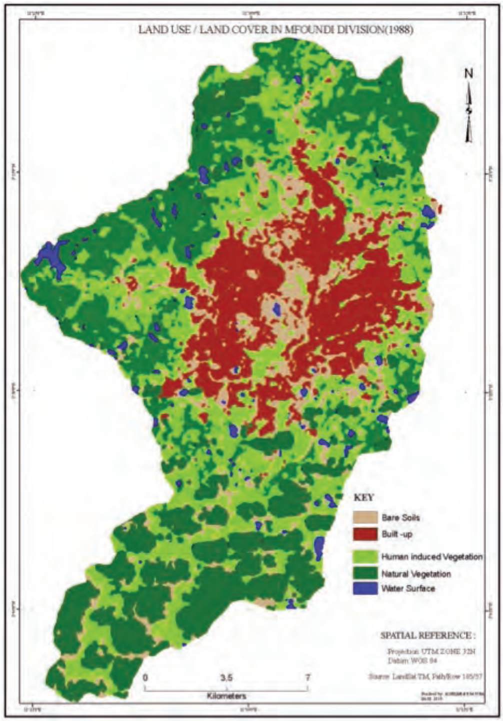
Roseline aspires to someday become "a great parent and a career woman … and teach environmental consultancy, reaching out to people and enhancing lives as best as I can."

Her father, now deceased, inspired her with his love for environmental education and for taking care of the environment. "He not only loved what he was doing but got his children and family into it. He always found time to reach out to the communities where we lived, educating them on farming, community health, and sanitation. So I got hands-on learning in community service as a young girl. I grew up knowing it's the right thing to do."

Roseline applied for the MyCOE / SERVIR fellowship because the MyCOE / SERVIR themes — women, climate change, food insecurity, and geospatial technology — were topics she planned to study for her dissertation. She also knew she needed to acquire GIS skills for satellite image analysis and projections for her dissertation. "I so badly needed skills in GIS and remote sensing to be able to move on with my PhD," she explains. "As a Geographer, GIS skills are required for data analysis and management in all the different subfields."

But Roseline did not have the money to pursue training on her own. MyCOE / SERVIR helped fill in the gaps in her professional and technical profile and take her passion for teaching and service into the research realm, where she is now contributing to the subfield of Participatory GIS. As a Capstone Fellow, she aims to do more networking, gain new insights into the professional world, and discover how her skills can meet the needs of different organizations.

Participatory Learning and Gender Partnerships in Climate Change and Food Security: Mfoundi-Yaoundé



Historical Land Use Land Cover in Mfoundi Division, 1988, prepared for comparison to current state of agricultural activities.

Roseline's knowledge of local communities and their needs inspired her to research the recent emergence of Peri-urban agriculture in Mfoundi- Yaoundé, as reflection of a worldwide trend gaining increased importance. Land use changes coupled with climate change and the underdevelopment of transportation and food storage systems are contributing to the increased need for productive Peri-urban agriculture for food security in her study site. Her work identified ways of using participatory learning incorporating GIS/GPS technology among women in an effort to mitigate food insecurity exacerbated by climate change.

To this end, change detection and visual analysis was done on locations affected by climate change but with agricultural green viability. The study revealed that 60 percent of women were engaged in Peri-urban agriculture. She found a high proportion of supplies to be perishables, representing an important resource to ensure food security in a context of rapid urbanization that makes access and transportation difficult. Home gardens offer vegetables and tubers to reduce periodic scarcity in the markets.

Discussions ensued in the field about reasons for farming techniques used, such as watering by hand.

However, changing rainfall patterns induce flash floods, while limited land availability and poor access to inputs are hampering the farm-intensification process. Community mapping in Roseline's project helped to revitalize community knowledge of the environment and awareness of means for meeting household food demands.

Reflecting upon her results, Roseline calls for sustainable participatory learning such that "science meets society and society reflects science." ■

Lateefah Oyinlola Maps Microbes to Warn Farmers of Changing Food Safety Risks

"I want my research output to have practical applications at household, national, and global levels, and MyCOE / SERVIR has created a pathway for me to achieve this goal."

As she was growing up, Lateefah's father made her understand that "worth doing at all is worth doing well." That maxim shows in her attitude and achievements as a graduate student in Food Microbiology and Biotechnology.

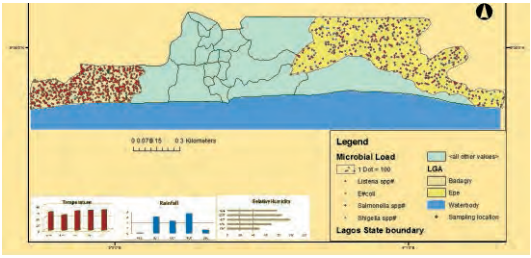
Lateefah sees the big picture, even as she peers carefully into the very small world of microorganisms. Strong inspiration came to her when she attended a lecture entitled "Biotechnology capacity building: the gateway of food security." Listening to the speaker, Lateefah discovered her passion — to conduct applied research relating to food safety. Because of that passion, Lateefah applied for the MyCOE / SERVIR Fellowship, envisioning the program as a way to widen her scope of possible approaches for contributing to knowledge and development in her chosen field.

The MyCOE / SERVIR Program, she says, introduced her to research findings on the use of geospatial data and technologies in addressing food safety issues. It also provided financial support to conduct her own research work. Furthermore, the structured outreach component of the fellowship enabled her to apply her study results to directly benefit those most at risk.

Lateefah organized a symposium for about 500 students preparing to become agricultural extension workers to share her research and results.

Assessment of Vulnerabilities of Fresh-Cut Vegetables to Climatic Variation, Lagos State, Nigeria

Fresh cut vegetables have been identified as sources of and vehicles for food borne illnesses. Lateefah's study evaluated the effect of climatic variation on the presence of various pathogens on fresh cut vegetables in Lagos state, Nigeria. She collected monthly samples of lettuce, green pepper, cucumber, and scent leaf from three commercial producers in Lagos state, namely Songhai, Dantata, and Best Food farms. Microorganisms such as Escherichia coli, Listeria spp., Salmonella sp., and Shigella spp., were isolated and analyzed along parameters of total coliform count and total plate count. Meanwhile, she collected climatic data from Nigeria's meteorological station for Lagos State**.** Lateefah combined these time series climatic data and the microbial results to construct a Risk Hazard Map using ArcGIS. She analyzed the microbial loads for the four kinds of sampled vegetables from the different farms at different times. She then drafted a Safety Manual, based on these mapped data, to train local farmers on how to minimize microbial hazards on the farm.



Microbial load on cucumber in Lagos State, December 2013

"My postgraduate journey has been made smooth with the MyCOE / SERVIR fellowship because it has exposed me to the use of geospatial technologies, and educated and empowered me to be a more effective researcher," explains Lateefah. ■

All MyCOE / SERVIR Teams and Projects from West Africa

BENIN

FELLOWS: Corine Sinsin and Evrard Akpla (Ecole Nationale Supérieure des Sciences et Techniques), **MENTOR: Belarmain Fandohan** (Ecole Nationale Supérieure des Sciences et Techniques); *"Use patterns and impact of climate change on the geographic distribution of suitable habitats for cultivation and conservation of Cochlospermum tinctorium (Bixaceae) in Northern Benin"*; *"Synsepalum dulcificum (Sapotaceae): Geographic distribution of suitable habitats for cultivation and conservation, use patterns and contribution to rural women's income in Southern Benin"*

CAMEROON

FELLOW: MBA Armstrong (University of Yaounde 1), **MENTOR: Agbor Delphine Ebangha** (National Cartographic Institute- Cameroon); *"Challenges of Climate Change to Household Dependency on Women for Food Security: Mapping a Historical Timeline in Widikum and Akwaya Areas of Cameroon"*

FELLOW: Nchu Innocent Ngiehnu (University of Dschang), **MENTOR: Eric Bertrand Kouam** (University of Dschang); *"Women's access to and control over agricultural land and natural capital: Implications on Food security and adaptation to climate change in Cameroon"*

All MyCOE / SERVIR Teams and Projects from West Africa (continued)

FELLOWS: Irene Njohjam Ngum, Cythia Abie Besem, Mildred Ndahetta Akah, Mofor Emmanuel Fondikum (University of Buea), **MENTOR: Venansius Nyuydini** (Environmental Resource Trust - Cameroon); *"Local Community Participation in Climate Change to Enhance Food Security Through Landuse Planning Process in Cameroon. Case Study: Nguti Sub Division, Southwest Region"*

FELLOW: Roseline Njih Egra Batcha (University of Yaoundé), **MENTOR: Paul Tchawa** (University of Yaoundé); *"Participatory Learning and Gender Partnerships in Climate Change and Food security: Mfoundi-Yaoundé Cameroon"*

COTE D'IVOIRE

FELLOW: Fidèle Gautier Ahounan (Félix Houphouet-Boigny University), **MENTOR: Lazare Tia** (Félix Houphouet-Boigny University); *"Use of geospatial data to support women and sustainable agriculture under climate change conditions in Northern Côte d'Ivoire"*

GHANA

FELLOW: Daniel Abu (Amity Institute of Higher Learning), **MENTOR: Odjobi Kwakye** (Organisation for Livelihood Enhancement Services); *"Research Topic on the Effects of GIS/GPS Applications among Women Vegetable Farmers in Shama District of the Western Region of Ghana"*

FELLOW: Barbara Baidoo (University of Ghana), **MENTOR: Opoku Pabi** (University of Ghana); *"The Vulnerability and Adaptation to Climate Change Impacts of Women Famers in the Agona West Municipal Assembly"*

NIGERIA

FELLOW: Abiodun Atoloye (University of Ibadan), **MENTOR: Beatrice Ogunba** (Obafemi Awolowo University); *"Spatial Analysis of Household Food Insecurity and Nutritional Status of Under-five Children in Akinyele Local Government, Ibadan, Nigeria"*

FELLOW: Amobichukwu Amanambu (University of Ibadan), **MENTOR: Christiana Emuh** (University of Ibadan); *"Adopting New Strategy in Adapting to the Impact of Climate Change on Agriculture and its Corresponding Impact on Women Along River Oshin, Kwara State, Nigeria "*

FELLOW: Betty Olubunmi (University of Ibadan), **MENTOR: Ibidun Adelekan** (University of Ibadan); *"Effect of rainfall variation and extreme rainfall events on cassava production and processing activities in Ibadan, South West Nigeria"*

FELLOW: Lateefah Oyinlola (Federal University of Agriculture, Abeokuta), **MENTORS: Adewale Obadina** (Federal University of Agriculture, Abeokuta), **Omemu A. Mobolaji** (Federal University of Agriculture, Abeokuta); *"Assessment of Vulnerabilities of Fresh –cut Vegetables to Climatic Variation Lagos State Nigeria"*

FELLOW: Oluwayinka Seun **Ojo** (Federal University of Technology, Akure), **MENTOR: Shadrach Olufemi Akindele** (Federal University of Technology, Akure); *"Assessment of the Willingness of Rural Women to Adopt Sustainable Agricultural Practices to Combat Climate Change: A Case Study within Akure Forest Reserve, Ondo State, Nigeria"*

FELLOW: Wasiu Alimi (University of Ibadan), **MENTOR: Abiodun Ayooluwa Areola** (University of Ibadan); *"Assessment of the Climatic and Socio-Economic Impacts of Illegal Logging in a Rainforest: The Role of Women"*

Climate Change, Landscape and Watersheds

Fellowship launch, capacity building and professional development workshop hosted by the USAID's Regional Development Mission for Asia, (RDMA) and held at the Asia Regional Training Center (ARTC) in Bangkok, Thailand, January 15 - 25, 2014.

USAID
FROM THE AMERICAN PEOPLE

Jirawat Panpeng Looks To Networking and Collaboration As Keys To Coping with Sea Level Rise

"Collaboration or networking among countries, efficient technologies, and knowledge are my inspirations to pursue research that can reduce the impacts of climate and help people cope with them."

Born in a small rural village in southern Thailand, Jirawat knows the value of connecting with neighbors. As a PhD student in Climate Change and Sustainable Development, he views catastrophic events such as the 2011 floods in Thailand, among other disasters in Southeast Asia and elsewhere, as reason for profound concern about the difficulties neighboring countries face in fighting problems associated with climate change.

Jirawat aspires to use geospatial data and GIS-based research to increase people's ability to collectively reduce the impacts of climate change on agriculture, aquaculture, livelihoods, and natural resources in coastal zones.

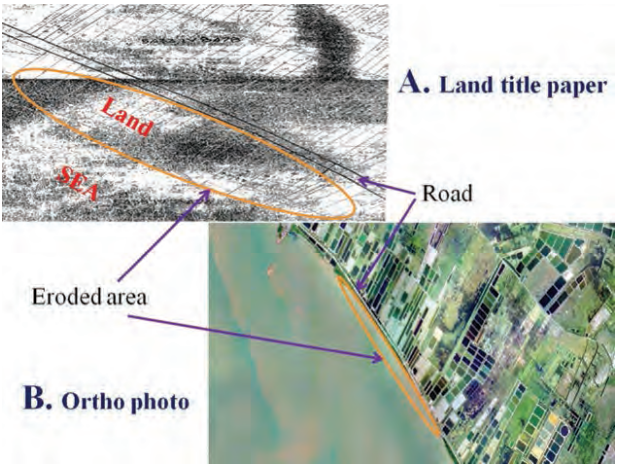
He considers GIS and remote sensing applications to be crucial tools for climate studies. He also recognizes the importance of finding ways to network among countries, particularly adjacent nations, for his climate research. He applied for the MyCOE / SERVIR fellowship because he saw it as a way to increase his understanding of GIS and remote sensing tools while exchanging knowledge with other scholars and participants.

Evidence of coastal erosion in Paknamlaemsing District.

Jirawat regards the program as an opportunity to learn more about techniques for GIS-based research and for creating effective presentations of plans and results. In addition, he believes that MyCOE / SERVIR represents a great chance to access a broader community of researchers in climate adaptation.

Vulnerability of Rural Coastal Communities in Eastern Gulf of Thailand to Potential Sea Level Change: Case of Laemsing District, Chanthaburi Province

Climate change that results in rising land and sea surface temperatures as well as rising sea levels affects coastal ecosystems like those in Jirawat's homeland. He notes that global mean sea level increased from 1.8 to 2.0 mm per year in 1961-2003 and 1971-2010, respectively. These increases caused coastal erosions and seawater intrusion, floods, and inundations, threatening the socioeconomic and environmental conditions of coastal communities in developing countries and on small islands around the world. Sea level rise increases the vulnerability of coastal countries in Southeast Asia, including Thailand, to changes in geographic conditions, seriously affecting coastal fishery communities, which are mostly dependent on natural resources but have little ability to adapt to the changes. In line with Thai Government efforts to raise awareness of the impacts of climate change and understand climate change vulnerability, Jirawat's research aims to identify potential vulnerability of the Laemsing District's coastal fishery communities that could be affected by severe sea level rise and its consequences, such as coastal erosion and inundation. Applying climate simulation and GIS software, he aims to analyze potential sensitivity of communities in terms of physical and social impacts of climate change. Jirawat's work promises to provide scientific opinions to stimulate the awareness of stakeholders, especially government and local people, about reducing the vulnerability of fishery communities to climate change. ■



Laemsing District is geographically vulnerable to sea level rise and its consequences.

Khin Seint Seint Aye Turns To Spatial Technology To Avert Lake Ecosystem Collapse

"I come from a developing country, and we do not have much advanced technology to support our research. But MyCOE / SERVIR teaches about using such advanced technologies as GIS and remote sensing to get more accurate results for our research projects. And with this program I can also meet people from different countries and share experiences."

Books such as "Silent Spring" by Rachel Carlson and "The Jungle " by Upton Sinclair sparked Seint Seint's interest in the role of environment and ecosystems. They inspired her to become an environmental scientist with background knowledge in health science. Currently she is pursuing her Master's Degree in Environmental Engineering Management.

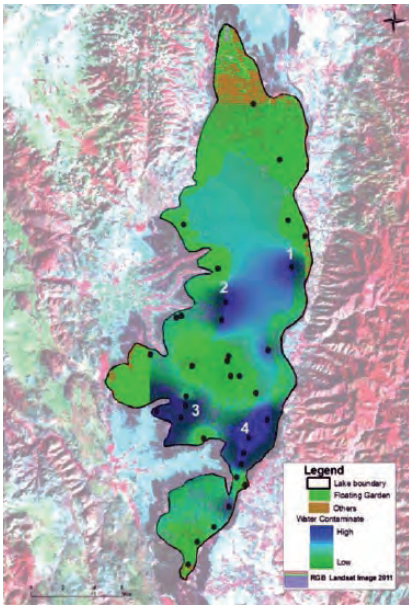
Seint Seint notes that Myanmar needs qualified personnel with broad understanding of both health science and environmental management in government and industries. As an environmental scientist, she plans to participate actively in society by using her knowledge. She also plans to collaborate with the government to get involved in implementation and establishment of rules and regulations for environmental degradation mitigation. Seint Seint hopes to help provide scientific guidelines to support government agencies, industries, and the public set up standards for pollution level control.

"I enthusiastically wish to effectively manage environmental toxicity leading to environmental health through sanitation systems," she says. "By doing this, we will surely reduce danger to our ecosystems and society."

The lake provides livelihood for local fishermen.

Impact of famous floating gardens on the environment and livelihoods of a unique Inle lake in Central Myanmar

Ethnic and cultural diversity, scenic beauty, and charming pagodas attract to the Inle Lake in Central Myanmar an ever-increasing number of tourists, both domestic and international. Intha communities and other ethnic groups traditionally live in stilt houses in and around the lake. The residents' primary livelihoods depend on aquaculture, fishing, and floating garden agriculture. The floating gardens were introduced to the lake in the 1960s as an ingenious biotechnology, and since then have fast become one of the highlights of the lake's cultural heritage. Lucrative benefits and low required investment continue to stimulate their extension. While floating gardens constitute a highly important livelihood for the community, the lake's ecosystem can sustain only a limited amount of such gardening without compromising its own natural balance.



Hotspots of cumulative impacts (effects) on the lake ecosystem generated using neighborhood analysis and overlay of raster outputs of water quality parameters and land use classifications.

Seint Seint's project will assess the impact of the floating gardens with a view to providing mitigation plans and preventing an imminent environmental collapse of the natural ecosystem. Specific objectives aim at an in-depth study of the impact of the floating gardens through Participatory Rural Appraisal, guiding further water analyses. These analyses will be underpinned by GIS and RS techniques facilitated by SERVIR.

Seint Seint plans to use these results to inform local and national stakeholders of the major cumulative impact exerted by further unabated growth of the floating gardens, particularly when coupled with climate change. She plans to undertake an outreach awareness campaign with relevant stakeholders, including resident communities, local youth organizations, schools, distant user communities, and product consumers, to raise awareness. ■

Tran Thi Mai Anh Seeks To Revive 'An Old Friend'

"My cool fresh green air was gone; dust, noise and pollution took its place. I feel so sad about that change, and really want green life to come back, so I chose a major related to the forest and environment."

Mai Anh aspires "to dramatically raise the height of the mountain of knowledge so that my successors may have a more accurate view of the universe around them." Majoring in Natural Resources Management, she plans to continuously seek challenging career opportunities as a natural resources manager and contribute significantly to biodiversity protection in her home country, Vietnam.

Mai Anh, born and raised in Luong Son town in mountainous Hoa Binh province, says, "I lived very close to the forest — my green family. I have seen a lot of that forest burned, cut, and destroyed. This led to deforestation and soil erosion, and some areas even became bare land due to industrialization. My cool fresh green air was gone; dust, noise and pollution took its place. I feel so sad about that change, and really want green life to come back, so I chose a major related to the forest and environment."

Most of Mai Anh's high school friends pursued majors related to economy, industry, and agriculture — promising specializations in terms of future employment. But Mai Anh remained steadfast in her choice of major, saying that it has guided her toward many "wonderful opportunities and precious chances" for reaching her goal of an environmental career. She counts her participation in MyCOE / SERVIR as one of those precious chances, noting that "GIS and remote sensing are strong useful tools for analyzing many environmental issues and are highly adaptable to many kinds of projects."

Google Earth imagery shows the site of the Huong Son Hydroelectric Power Plant.

Application of GIS and Remote Sensing in Administering Payment For Forest Environmental Services at Huong Son Hydroelectric Power Plant's Watershed, in The Ha Tinh Province

Forests benefit the environment by preventing soil desiccation, greenhouse gas absorption, and more. Mai Anh, together with classmates Ha Nguyen Thi, and Thi Nguyen Van, form a MyCOE / SERVIR team that is exploring how a recent government-established national Payment for Ecosystem Services program could leverage spatial techniques for evaluating forest environmental services such as the benefits listed above. Currently, Vietnam focuses on paying for protective services (such as water retention, soil protection) only at the watershed scale. Monitoring and evaluation of the variability of forest characteristics is typically used to determine pricing of these watershed services, but methods for assessing changes in forest resources have been limited to traditionally collected statistics in aggregate form. Because of this, the data often lacks accuracy and cannot indicate characteristic changes in forest conditions. As an alternative to the conventional method, Mai Anh and her team's study uses GIS and advances in remote sensing to consider a variety of interacting factors and land cover changes over time. The team plans to delineate features and boundaries of the Huong Son watershed, evaluate forest status, produce a Payment for Ecosystem Services Map, and provide recommendations for evaluating forest resource changes over time. They hope their study results will contribute to the scientific basis for practical assessment of forest resource changes and aid the implementation of policies in this hydroelectric watershed in Vietnam.

Mai Anh and teammates work on communication strategies for their project during the MyCOE / SERVIR launch workshop in Bangkok.

Asked what her greatest hope is, Mai Anh responds: "I hope that someday, beautiful nature will come back as an old friend." ■

Nguyen Minh Khoa Finds A Way

"When you have someone who mentors you enthusiastically and someone who is ready for listening and interested in your sharing, you can have your idea developed and take it to the world."

Khoa loves to learn. "I want to better comprehend my living place and dedicate myself to its development," he says. "I have a goal of making my hometown better and brighter by trying my best."

Nicknamed "Map-aholic" by his friends, Khoa aspires to help lost travelers find their way.

"I have a dream of making maps because it is the easiest way for everyone to get where they want to go," he explains. In turn, he appreciates others who guide him. He notes that, while people in developing countries still face many obstacles in accessing modern technologies, MyCOE / SERVIR provides him access to them and instruction in their use. Learning and practicing with these tools, he believes, will help him improve his professional GIS and mapping skills and research. Making maps to show his research results is, in fact, already helping him explore environmental change in the Mekong Delta.

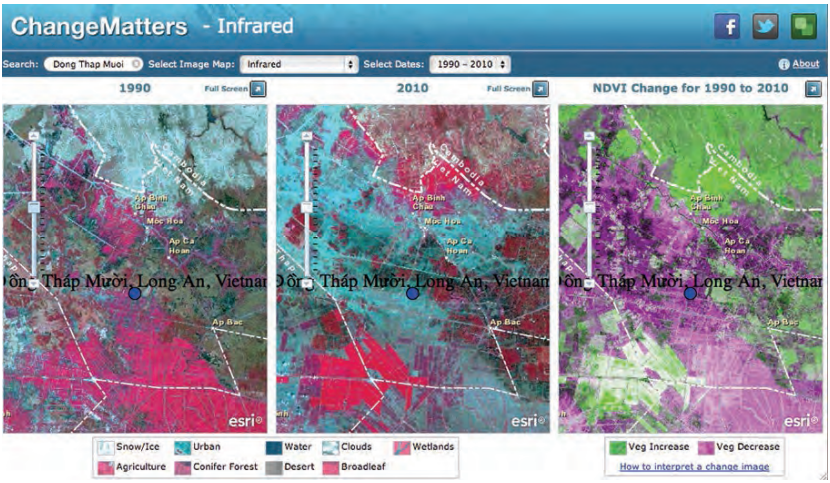
Khoa enjoys fieldwork as an important part of his research activities.

Changes of paddy rice extent and its possible effect on the environment in Mekong delta, 1980-2012

Mekong Delta, located downstream of the Mekong River, is one of the two largest deltas of Vietnam. The delta has an area of approximately forty thousand square kilometers and is home to more than seventeen million people. Physical conditions there such as climate, soils, and water are suitable for developing agriculture, especially rice paddies. Khoa's work observes changes in the way land is used in the delta for agriculture. Specifically, his study aims to identify rice paddy extent changes over time and the possible effect of these changes on the environment in the Mekong Delta. Remote sensing technology is considered an effective tool for observing and detecting such changes over time, but data and imagery are not always readily available. Khoa will produce a set of maps visualizing the changes he finds in order to suggest mitigating solutions to anticipated environmental impacts such as flooding.

"MyCOE/ SERVIR gives me a chance to do what I love and apply what I learned," he says. "It also allows me to share research results with a community. It is a practical program with applications in the real world." His research will be shared among local stakeholders and other fellows in his region, with the global program more broadly, and through a unique collaboration with NASA's DEVELOP Program introduced via a former MyCOE / SERVIR participant from the pilot fellowship program in 2009.

The DEVELOP team of students working in the United States will provide flood impact assessment maps for inclusion in the Mekong Delta change time series of Khoa's MyCOE / SERVIR project. Meanwhile, Khoa will be providing in situ data points for validation of the DEVELOP results. Together these students will help each other find their way towards solutions to watershed management. ■



Powered by NASA Landsat data, Esri's ChangeMatters tool shows significant decrease in vegetation from 1990 to 2010 for Khoa's research site.

All MyCOE / SERVIR Teams and Projects from Southeast Asia

CAMBODIA

FELLOW: **Visal Yoeung** (Asian Institute of Technology), **MENTOR:** **Oleg Shipin** (Asian Institute of Technology); *"Causes, Impacts and Mitigation of Filamentous Algae Blooms in a High Profile Transboundary Mekong River Area, Ramsar Wetlands in Northern Cambodia"*

LAOS

FELLOW: **Thidalath Vongsayalath** (Asian Institute of Technology), **MENTOR:** **Oleg Shipin** (Asian Institute of Technology); *"Causes, Impacts and Mitigation of Filamentous Algae Blooms in a High Profile Transboundary Mekong River Area, Ramsar Wetlands in Southern Laos)*

MYANMAR

FELLOW: **Khin Seint Seint Aye** (Asian Institute of Technology), **MENTOR:** **Oleg Shipin** (Asian Institute of Technology); *"Impact of famous floating gardens on the environment and livelihoods of the unique Inle lake in Central Myanmar"*

THAILAND

FELLOW: **Jirawat Panpeng** (Asian Institute of Technology), **MENTOR:** **Puvadol Doydee** (Kasetsart University); *"Vulnerability of Rural Coastal Communities in Eastern Gulf of Thailand to Potential Sea Level Change: Case of Laemsing District, Chanthaburi Province"*

FELLOW: **Sunsanee Arunyawat** (Asian Institute of Technology), **MENTOR:** **Rajendra P. Shrestha** (Asian Institute of Technology); *"Developing Land Use System for Sustainable Agricultural Land Use Planning in Upper Kwaenoi Watershed, Kanchanaburi, Thailand"*

VIETNAM

FELLOW: **Dieu Thuy** Tran (Hanoi National University of Education), **MENTOR:** **Xuan Duy Tran** (Hanoi National University of Education); *"Exploring land use land cover change to understand urban warming effect in Hanoi, Vietnam "*

FELLOWS: **Duy Khuong Tran** (Hue University of Agriculture and Forestry) and **Thi Phuong Thao Nguyen** (Hue University of Agriculture and Forestry), **MENTOR:** **Hoang Thai Ho Dac** (Hue University of Agriculture and Forestry) ; *"Forest cover change and land use strategy of upland people in Truong Son mountain center under impact of Truong Son road from 2000 to 2013"*

FELLOW: **Khoa Minh Nguyen** (Vietnam National University, Ho Chi Minh City), **MENTOR:** **Viet Pham** (University of Social Sciences and Humanities, Ho Chi Minh City); *"Changes of paddy rice extent and its possible effect on the environment in Mekong delta, Vietnam, 1980-2012"*

FELLOWS: **Thi Mai Anh Tran** (Vietnam Forestry University), **Thi Ha Nguyen** (Vietnam Forestry University), **Thi Nguyen Van** (Vietnam Forestry University), **MENTOR:** **Phung Van Khoa** (Vietnam Forestry University); *"Application of GIS and Remote Sensing in Administering Payment For Forest Environmental Services at Huong Son Hydroelectric Power Plant's Watershed, in The Ha Tinh Province, Vietnam"*

FELLOW: **Duc Thang** Nguyen (Vietnam Forestry University), Minh Huyen Nguyen Pham (Vietnam Forestry University), Do Nhu Trung Duc (Vietnam Forestry University), Mentor: Bui The Doi (Vietnam Forestry University) "Mangrove Forest Management"

FELLOWS: **Phu Nguy Nguyen Nhu** (Hue University of Agriculture and Forestry) and **Kha Do Thi** (Hue University of Agriculture and Forestry), **MENTOR:** **Hoang Ho Dac Thai** (Hue University of Agriculture and Forestry); *"Potential of coastal protection forest restoration with indigenous tree species for disasters risk reduction in Thua Thien Hue, Vietnam"*

Biographies

DR. PATRICIA SOLÍS, MyCOE / SERVIR Global Fellowship Program Director, Director of Outreach and Strategic Initiatives, Association of American Geographers (AAG)

Dr. Solís creates programs that combine communication technologies, geographic sciences, youth leadership and citizen engagement. She has designed and implemented this MyCOE / SERVIR Global Fellowship Program and many other international research collaborations in 50 countries across the Americas, Asia, and Africa. Her work establishes intellectual frameworks and technical platforms to bring interdisciplinary groups of students, scholars, scientists, and educators together to use geography and geographic technologies to address timely environmental issues such as biodiversity, climate change, food security, and education. She has led large complex projects through at least 50 major grants in excess of $7 million from corporate, foundation, government, and donors. Recent programs include high school virtual exchanges and international geospatial training programs for 250+ participants in 50 countries, and outreach efforts reaching 25,000+ youth. Under her leadership of the MyCOE Secretariat at AAG, the program was recognized by the UN Conference on Sustainable Development as a Model Sustainable Partnership and is considered to be the longest continuously operating U.S. Public-Private Partnership of its kind. Solís holds a PhD in Geography from the University of Iowa, and a Masters in Geography, BS in Physics from Kansas State University. Solís was recently elected as the Vice President of the Pan American Geography Commission of the Institute for Geography and History of the OAS.

DR. NANCY SEARBY, Capacity Building Program Manager in the NASA Applied Sciences Program in the Earth Sciences Division

Nancy Searby is leading the program's efforts to build skills in use of Earth observations to make decisions in the US and developing countries. Nancy oversees four NASA Center-based projects - DEVELOP, SERVIR, Gulf of Mexico Initiative, and Applied Remote Sensing Training – that aim to improve the ability of local, regional, state, national, and multi-national stakeholders to make decisions informed by earth science observations and models. She participates in related interagency, international, and public-private partnership activities. The Capacity Building Program helps stakeholders make decisions in nine areas of societal benefit identified by the Group on Earth Observations, including disasters, ecosystems, biodiversity, weather, water, climate, health, energy, and agriculture. Nancy has a PhD in mechanical engineering from Stanford University and BS and MS degrees in aerospace engineering sciences from the University of Colorado-Boulder. Past experience includes space flight hardware development for the Space Shuttle and the International Space Station, space life sciences research, and NASA Agency-level studies and analyses.

DANIEL IRWIN, SERVIR Director at NASA Marshall Space Flight Center

Daniel E. Irwin is a NASA research scientist with over 20 years of experience in satellite remote sensing applications and Geographic Information Systems (GIS) in the developing world. Daniel is currently the Director for SERVIR, which was recognized as one of the "100 steps toward the Global Earth Observation System of Systems (GEOSS)." Prior to joining NASA, Daniel lived and worked in Guatemala, developing leading GIS laboratories for conservation organizations and the Guatemalan government. A primary objective of his work was to demonstrate how satellite data could be used for forest conservation and economic development throughout the tropics. Daniel has organized numerous satellite remote sensing and GIS workshops and trained hundreds of scientists and researchers. In 2008, Daniel received the Charles S. Falkenberg Award, presented jointly by American Geophysical Union and the Earth Science Information Partnership. In 2013, Daniel received a "Recognition of Brilliance" award from the Guatemalan government for "two decades of capacity building and technical support for improved management of the Maya Biosphere Reserve and the Guatemalan System of Protected Areas." Outside of work, Daniel develops and promotes small businesses in rural Central American villages to provide economic alternatives to tropical rainforest slash-and-burn agriculture. He has also built a children's library and several playgrounds in rural villages in Guatemala.

JENNY FRANKEL-REED, Senior Climate Change Specialist and Coordinator of the SERVIR Program with USAID's Climate Change Office in the Bureau for Economic Growth, Education, and Environment (E3)

Ms. Frankel-Reed has provided technical support to programs in 20 countries and regions across Asia, Africa, and Latin America. Ms. Frankel-Reed has worked on the vulnerability and adaptation dimensions of climate change for more than 10 years, including vulnerability assessment, adaptation project design, monitoring and evaluation, international climate financing, and training. Prior to joining USAID in 2010, she served as Technical Advisor for an adaptation program focused on resilient rural development in India with German International Cooperation (GIZ) based in New Delhi, was an Adaptation Advisor with the Environment and Energy Group of the United Nations Development Program, and worked as a Climate Change Consultant to the Global Environment Facility. Ms. Frankel-Reed has forest and human ecology research experience in the Brazilian Amazon and Pacific Northwest of the U.S., and holds a Master in Environmental Management (MEM) from Yale School of Forestry and Environmental Studies and BS in Environmental Science from Willamette University.

The MyCOE / SERVIR Staff and Instructor Team

Dr. Patricia Solís, MyCOE / SERVIR Global Fellowship Program Director
Dr. Jimmy Adegoke, University of Missouri-Kansas City
Birendra Bajracharya, International Centre for Integrated Mountain Development
Samjwal Bajracharya, International Centre for Integrated Mountain Development
James Eshun, University of Cape Coast
Matthew Hamilton, Association of American Geographers
Dr. Niem Huynh, Association of American Geographers
Dr. Tesfaye Korme, Regional Center for Mapping of Resources for Development
Andre Kooiman, NASA SERVIR Coordination Office
Erick Khamala, Regional Center for Mapping of Resources for Development
Mary Ama Kudom-Agyemang, Environmental Communicator
Candida Mannozzi, Association of American Geographers
Phil Mantey, University of Ghana
Dr. Florence Margai, Binghamton University
Dr. Richard Marston, Kansas State University
Dr. Foster Mensah, Centre for Remote Sensing and Geographic Information Services
MSR Murthy, International Centre for Integrated Mountain Development
Dr. Soe Myint, Arizona State University
Peter Ndunda, The Green Belt Movement
Astrid Ng, Association of American Geographers
George Owusu, Centre for Remote Sensing and Geographic Information Services
Dr. Michael Solem, Association of American Geographers
Sebastian Wesselman, International Centre for Integrated Mountain Development
Nekya Young, Association of American Geographers
Marcela Zeballos, Association of American Geographers

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