

Dr. Gumma Murali Krishna

Award winner for best Scientific Research Papers published in PE&RS, 2008
 2nd Best PhD thesis award from Jawaharlal Nehru Technological University, 2008-09
 Lead team member of Global Irrigated Area Mapping (GIAM) project at IWMI
 Best Team Award for the Global Irrigated Area Mapping (GIAM) project team

International work experience:

North Asia: China
South Asia: India, Nepal, Bangladesh, and Sri Lanka
Southeast Asia: Philippines, Indonesia, Thailand and Vietnam
Central Asia: Uzbekistan
West Africa: Burkina Faso and Ghana.
East Africa: Tanzania

1.0 Personal Information

Name : Murali Krishna Gumma
Date of Birth : 15 July 1975
Marital Status : Married and 2 children
Nationality : Indian

2.0 Contact details

Dr. Gumma Murali Krishna
 Remote Sensing and GIS Specialist (Collaborative Research Scientist)
 International Rice Research Institute (IRRI)
 C/o ICRISAT, Patancheru, Hyderabad
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3.0 Education

2003 - 2008 Ph.D. Spatial Information Technology (Remote sensing), Jawaharlal Nehru Technological University, Hyderabad (India).
 2000 - 2002 M. Tech. Spatial Information Technology (Remote sensing), Jawaharlal Nehru Technological University, Hyderabad (India).
 1991 - 1998 B. Tech. Civil Engineering, Nagarjuna University (India).

4.0 Professional Experience *[starting with current]*

Jun 2012 to Till date Collaborative Research Scientist at International Rice Research Institute (IRRI), Los Banos, Philippines.
 Jan 2010 to May 2012 Post-Doctoral fellow at International Rice Research Institute (IRRI), Los Banos, Philippines.
 Aug 2008 to Jan 2010 Special Project Scientist at International Water Management Institute (IWMI (INDIA)) C/o ICRISAT, Hyderabad, Andhra Pradesh, India.
 Jun 2007 to Jul 2008 Regional Research Officer at International Water Management Institute (IWMI) Colombo, Sri Lanka.

CV of Dr. Gumma Murali Krishna, Collaborative Research Scientist, IRRI

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May2003 to Scientific officer at International Water Management Institute (IWMI (INDIA)) C/o
Apr2007 ICRISAT, Hyderabad, Andhra Pradesh, India.

Jan 2002 to Project Associate at Centre for Spatial Information Technology, Hyderabad, Andhra
Apr2003 Pradesh, India.

June '98 to Oct GIS Engineer in ND Soft solutions. (Recognized by Department of Space, Govt. of India.)
2000

5.0 Language Skills

	<u>Written</u>	<u>Spoken</u>
English	excellent	excellent
Telugu	excellent	excellent
Hindi	Good	Good

6.0 Key Qualifications and achievements overview

Highlights:

- 12+ years of experience in mapping and spatial modeling in the fields of agriculture, water resources, natural resources and environment
- Currently working with IRRI and associated with various international projects related to remote sensing and modeling approaches to characterize spatial and temporal patterns of effect of drought stress and other a-biotic stresses on rice production.
- Worked at IWMI in various international projects related to Landuse/ cover classification, Irrigated Area Mapping, Agricultural Water Management using satellite remote sensing.
- Specialized in spatial data analysis and ability to develop spatial models for analyzing complex problems at various spatial and temporal scales
- One of the core team member at IWMI's spatial data gateway project
- Knowledge of wide variety of satellite remote sensing systems and sensors and their applications
- Well versed with GIS, spatial modeling, and algorithm development
- Field experience in different countries (India, China, Sri Lanka, Bangladesh, Nepal and West Africa: Ghana and Burkina Faso)
- Published – papers in the refereed journals of international repute (PE&RS, International journal of Remote sensing and Applied Remote Sensing, Agriculture, Ecosystems and Environment and etc.)
- Doctoral Research in the field of irrigation water management.
- Post graduate in Spatial Information Technology (Remote sensing / GIS) with Civil Engineering background

Currently, I am leading the remote sensing components of 3 projects in Asia. These projects are:

1. Seasonally updated information on rice agro-ecologies using innovative remote-sensing and mapping systems.
2. Characterization of abiotic and biotic stresses in major rice growing areas.
3. Develop the spatial model for selecting the best sites for Rice cultivation in the inland valley agro ecosystems using multi-resolution remote sensing and GIS spatial modeling.
4. To estimate the area of adoption of sub1 varieties (for submergence) and of short duration varieties (for drought avoidance) during 2012 and 2013.
5. Suitability mapping

Prior to IRRI worked as a Special Project Scientist at International Water Management Institute (IWMI) a CGIAR-supported research institute, from Aug 2008 to Dec 2009. One of the core team members in a variety of Remote Sensing and GIS application projects at IWMI, with significant contributions to the Global Irrigated Area Mapping

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(GIAM) at various resolutions, harmonization of IWMI's spatial data gateway (IWMIDSP), and Wetlands Mapping using RS/GIS techniques. Member of the core group involved in capacity building through training workshops, guidance to interns and services to Head quarters and Regional offices research community.

Specific experience and expertise is in using multi-scale Space borne remotely sensed data and GIS for developing the spatial models for selecting best sites for agriculture; Global irrigated area mapping; Global rainfed cropland mapping; biodiversity; large-area (landscape level) characterization studies; hyper-spectral studies; land use studies assessment and mapping; resource inventorying; natural resources monitoring and mapping; crop type identification and mapping; characterization and mapping of agro-ecosystems/land use systems; water resources and hydrology;

GIS based spatial modeling for: (a) biodiversity characterization, agro-ecosystems and development of Spatial Landscape Analysis Model (SPLAM); and (b) decision support systems (DSS).

Important projects with significant contribution at IWMI include:

- A. Irrigated area mapping of the Krishna river basin (India) using multiple sensor data and secondary data (MODIS, AVHRR, LANDSAT ETM+, IRS-P6 and IKONOS);
- B. Wetland mapping in Ghana using sub meter to 30m remote sensing data;
- C. Shallow groundwater irrigation using Landsat 30 m and QuickBird data;
- D. Water productivity studies in the Krishna river basin (India) and Syr Darya river basin (Central Asia).
- E. Irrigated area of China using MODIS 250m and Landsat 30m data;

One of the core team members of the IWMI's spatial data gateway or IWMIDSP (www.iwmidsp.org). IWMIDSP is a popular global public good (GPG) as a spatial data gateway housing unique data at global, regional, national, and river basins and is accessed by some 2000+ visitors every month from 70+ countries.

7.0 Awards and Honors *[starting with most recent]*

- 2009 **Second best PhD thesis award from Jawaharlal Nehru Technological University.**
- 2008 **Second Place Recipients of the 2008 John I. Davidson ASPRS President's Award for Practical papers (Paper entitled: "Spectral Matching Techniques to Determine Historical Land use/Land cover (LULC) and Irrigated Areas using Time-series AVHRR Pathfinder Datasets in the Krishna River Basin, India. Photogrammetric Engineering and Remote Sensing. 73(9): 1029-1040.")**
- 2007 **Special achievement in GIS (SAG) award from ESRI.** Awarded for the International Water Management Institute (IWMI) from Environmental Systems Research Institute (ESRI) for our innovative spatial data and knowledge gateway: <http://www.iwmidsp.org>. SAG award sites selected from 300,000 sites globally. Dr.Prasad has received the award on behalf of IWMI as its head of RS\GIS unit from Mr. Jack Dangermond, President of ESRI on June 19, 2007 at the San Diego Convention Center, San Diego, USA.
- 2006 **Best team:** The Global Irrigated Area Mapping (GIAM) team headed by me was awarded the "best team" during the IWMI's annual research meeting of 2006.
- 2006 **Best paper (one of the 5).** One of the 5 best papers in the IWMI Annual research meeting (ARM) 2006. Biggs, T., Thenkabail, P.S., **Gumma, M.K.**, GangadharaRao, P., and Tural, H., 2006b.. Vegetation phenology and irrigated area mapping using combined MODIS time-series, ground surveys, and agricultural census data in Krishna River Basin, India. International Journal of Remote Sensing. 27(19):4245-4266.

8.0 Data and Knowledge Gateways released

Global public good (GPG) web portals released:

1. IWMI Data Storehouse Pathway (IWMIDSP: www.iwmidsp.org)
2. IWMI Satellite Sensor Based Global Map of Irrigated Areas (IWMIGMIA: www.iwmiwiam.org)

3. Knowledge Base System for Sri Lanka (KBS-Lanka: <http://www.iwmikbs.org>)
4. Tsunami Satellite Data Catalog (TSDC: <http://tsdc.iwmi.org>)
5. Krishna basin (Krishna-basin: <http://krishna-basin.iwmi.org/>)

9.0 List of Assignments, Projects

January 2010 - Till date Responsible for Remote sensing, GIS, field campaigns, Supervise 2 GIS staff and interact with IRRI colleagues and international collaborators.

- **Mapping rice cultivation in Asia using remote sensing (MODIS imagery).**
- **Mapping rice-ecosystems using active remote sensing (RADAR imagery) in Philippines.**
- **Use remote sensing and modeling approaches to characterize spatial and temporal patterns of effect of drought stress and other a-biotic stresses on rice production.**
- **Use remote sensing and modeling approaches to study spatial and temporal variation in rice yield in Asia.**
- **Collaborate with other IRRI scientists (crop modelers, Physiologists, plant breeders, economists) to assure quality and use of the results.**

August 2008- January 2010 Responsible for Remote sensing analysis, GIS, field campaigns, and database management.

- **Develop the spatial model for selecting the best sites for Rice cultivation in the inland valley agro-ecosystems** of Ghana using multi-resolution remote sensing and spatial modeling.
- **Detecting shallow groundwater irrigation in Northern Ghana.** This study uses Quickbird data to characterize and map shallow groundwater irrigation such as dug wells and dug outs. I have developed automated classification using decision tree algorithm.
- **Map to Identify areas with highest potential impact for groundwater utilization in the AGRA study countries** (13 countries in Africa).
- **Develop models and maps for Groundwater potential zones.**

- May 2007 to July 2008
- Responsible for Remote Sensing/GIS, field campaigns, and database management.
- Provided critical spatial data and analysis to the remote sensing researchers
 - Multi-domain spatial database management
 - Coordinated and participated in the regional-scale field campaigns for image classification, accuracy assessment, and conducting crop cutting experiments
 - Working on Global Irrigated Area Map at 250m and 30m (GIAM @ 250m and 30m) and related products and biodiversity characterization at landscape level using multi-sensor, time-series satellite sensor data at various scales and resolutions. The study demonstrated, for the first time, the use of quantitative and qualitative spectral matching techniques (SMTs), generation of ideal spectra in analyzing long time-series satellite images, and innovative techniques for sub-pixel area calculations (e.g., sub-pixel decomposition technique). In addition, extensive use of spatial modelling, decision tree algorithms, and Google Earth data for accuracy evaluations were investigated. The GIAM project also led to many innovations in data composition and analysis such as mega-file composition that involved 100s and even 1000s of bands of data in a single file.

Projects worked/working

- Selecting the Most Suitable Areas of rice Cultivation in the Inland Valley Wetlands of **Ghana**
- Delineating the shallow ground water irrigated areas using various resolutions images for Volta basin, **Ghana, Burkina Faso**.
- Irrigated area mapping using Multi-temporal data in **China**.
- Irrigated area mapping using Multi-temporal data in **Ghana**.
- Water productivity mapping in Syr-Darya basin, **Central Asia**.

- May 2003 to 2007
- Responsible for Remote sensing, GIS, field campaigns, and database management.
- Assisted the IWMI South Asia remote sensing researchers by providing necessary Remote sensing and GIS data and analysis
 - Involved in management of multi-domain database
 - Participated in the regional-scale field campaigns for image classification, accuracy assessment, and conducting crop parameters

Projects worked/working

- Irrigated area mapping using Multi-temporal data in Krishna River Basin
- Water productivity mapping in Krishna River Basin (ACIAR Project)
- Global irrigated area mapping (GIAM) using AVHRR and MODIS data
- Resource Centers on Urban Agriculture and Food Security- Cities Farming for Future
- Ensuring Health and Food Safety from Waste Water Irrigation in South Asia (BMZ Supported)
- Socio-economic study of waste water dependent livelihoods

- Jan 2002 to Apr 2003
- Responsible for Remote sensing, GIS, field campaigns, and database management.
- Catchment Area Treatment for Nagarjuna Sagar Tail Pond Dam
 - Visual interpretation of satellite images
 - Conducting ground truth field visits

June 1998 to • Geo Database management
 Oct 2000 • Data conversion from analog to digital data

10.0 Publications

Journal Articles

1. **Gumma, M.K.**, Daniel, V.R., Andrew, N., Thenkabail, P.S., Venkat, A. R. and Priyanie, A., (2012). Expansion of urban- and wastewater irrigated areas in Hyderabad, India. *Irrigation and Drainage Systems*. 25, 135-149. doi: 10.1007/s10795-011-9117-y.
2. Thenkabail, P.S., Knox, J.W., Ozdogan. M., **Gumma, M.K.**, Congalton, R., Wu. Z., You. S., Milesi. C., Giri. C., Nagler. P., Finkral. A., Marshall. M., and Mariottio. I., (2012) Assessing future risks to agricultural productivity, water resources and food security: how can remote sensing help? *Photogrammetric Engineering and Remote Sensing*. (Press).
3. Pavelic, P, Uday, P, Sreedhar A.N, Kiran, J, and **Gumma, M.K.**. (2012) Role of Groundwater in Buffering Irrigation Production against Climate Variability in South-West India. *Agriculture Water management*. 103, 78-87.
4. **Gumma, M.K.**, Andrew, N., Aileen, M., Thenkabail, P.S., and Islam, S. 2012. Rice cropping patterns in Bangladesh. *Rice Today*, 11(1)24-25.
5. Mohanty, S, Das, S.R, **Gumma M.K.** 2012. Odisha: The future granary of India. *Rice Today*, 11(1)44-45
6. **Gumma, M.K.**, Andrew, N., Thenkabail, P.S. and A.N.Singh.. (2011). Mapping rice areas in South Asia using MODIS multi temporal data. *Journal of Applied Remote Sensing*, Vol 5, 053547 (Sep 01, 2011); doi:10.1117/1.361983.
7. **Gumma, M.K.**, Gauchan, D, Andrew, N., Pandey, S. and Rala, A. (2011). Temporal changes in rice-growing area and their impact on livelihood over a decade: a case study of Nepal. *Agriculture, Ecosystems & Environment*. 142 (3-4), 382-392.
8. **Gumma, M.K.**, Thenkabail, P.S., Muralikrishna, I.V., Velpuri, M.N., Gangadhararao, P.T., Dheeravath, V., Biradar, C.M., Acharya Nalan, S., Gaur, A., 2011. Changes in agricultural cropland areas between a water-surplus year and a water-deficit year impacting food security, determined using MODIS 250 m time-series data and spectral matching techniques, in the Krishna River basin (India). *International Journal of Remote Sensing* 32(12), 3495-3520.
9. **Gumma, M.K.**, Thenkabail, P.S., Fujii, H., Nelson, A., Dheeravath, V. Rala, A., and Busia. D. 2011. Mapping Irrigated Areas of Ghana Using Fusion of 30 m and 250 m Resolution Remote-Sensing Data. *Journal Remote Sensing*. 2011, 3(4), 816-835.
10. **Gumma M.K.**, Thenkabail P.S., Nelson A. Mapping Irrigated Areas Using MODIS 250 Meter Time-Series Data: A Study on Krishna River Basin (India). *Journal Water*. 2011; 3(1):113-131.
11. **Gumma, M.K.**, Andrew, N., Thenkabail, P.S., Singh, A.N., Garcia, C., Aileen, M., and Lorena, V. 2010. Mapping rice areas in South Asia. *Rice Today*, 9(3)44-47.
12. **Gumma, M.K.**, Thenkabail, P.S., and Barry, B. 2010. Delineating shallow groundwater irrigated areas in the Atankwidi watershed (northern Ghana, Burkina Faso) using Quickbird 0.61-2.44 meter data. *African Journal of Environmental Science and Technology*, 4(7) 455-664.

13. Fujii, H., **Gumma, M.K.**, Thenkabail, P.S. and Regassa, N., 2010. Spatial Model for Selecting the Most Suitable Areas of rice Cultivation in the Inland Valley Wetlands of Ghana using Remote Sensing and GIS. *Japanese society of Irrigation, drainage and rural Engineering (JSIDRE)*. Vol.78 No.4 pp47-55.
14. Thenkabail, P.S., Munir A.H., Dheeravath, V. and **Gumma, M.K.**, 2010. A holistic view of global croplands and their water use for ensuring global food security in the twenty-first century through advanced remote sensing and non-remote sensing approaches. *Remote Sensing* 2010. 2(1), 211-261.
15. Venot, J.P., Jella, K., Luna, B., Biju, G., Trent, B., Gangadhararao, T.P., **Gumma, M.K.**, Sreedhar, A.N., 2010. Changing water supply Farmers' adjustments and regional changes in land use in the Nagarjuna Sagar irrigation project, South India" *Journal of Irrigation and Drainage Engineering*, 139(9):595-609.
16. **Gumma, M.K.**, Thenkabail, P.S., Fujii, H., and Regassa, N., 2009. Spatial Model for Selecting the Most Suitable Areas of rice Cultivation in the Inland Valley Wetlands of Ghana using Remote Sensing and GIS. *Journal of Applied Remote Sensing*. Vol. 3, 033537 (2009); DOI:10.1117/1.3182847.
17. Dheeravath, V., Thenkabail, P.S., Chandrakantha, G., Noojipady, P., Reddy, G.P.O., Biradar, C.M., **Gumma, M.K.**, and Velpuri, M. 2009. Irrigated areas of India using MODIS 500 m time series for the years 2001-2003. *ISPRS Journal of Photogrammetry and Remote Sensing*. 65(2009):42-59.
18. Velpuri, N.M., Thenkabail, P.S., **Gumma, M.K.**, Biradar, C.B., Noojipady, P., Dheeravath, V., Yuanjie, L., 2009. Influence of Resolution in Irrigated Area Mapping and Area Estimations. *Photogrammetric Engineering & Remote Sensing*. 75, 1383-1395.
19. Thenkabail, P.S., Biradar C.M., Noojipady, P., Dheeravath, V., Li, Y.J., Velpuri, M., **Gumma, M.**, Reddy, G.P.O., Turrall, H., Cai, X. L., Vithanage, J., Schull, M., and Dutta, R. 2009. Global Irrigated Area Map (GIAM) for the End of the Last Millennium Derived from Remote Sensing. *International Journal of Remote Sensing*. 30(14): 3679-3733. July, 20, 2009.
20. Thenkabail, P. S.; Dheeravath, V.; Biradar, C. M.; Gangalakunta, O. P.; Noojipady, P.; Gurappa, C.; Velpuri, M.; **Gumma, M.K**; Li, Y. Irrigated Area Maps and Statistics of India Using Remote Sensing and National Statistics. *Remote Sens*. 2009, 1(2), 50-67.
21. Biradar, C.M., Thenkabail, P.S., Noojipady, P., Yuanjie, L., Dheeravath, V., Turrall, H., Velpuri, M., **Gumma, M.K.**, Reddy, O.G.P., Xueliang, L. C., Schull, M.A., Alankara, R.D., Gunasinghe, S., Mohideen, S., Xiao, X. 2009. A global map of rainfed cropland areas (GMRCA) at the end of last millennium using remote sensing. *International Journal of Applied Earth Observation and Geoinformation*. 11(2009). 114-129.
22. Cai, X., Thenkabail, P.S., Biradar, C.M., Alexander, P., **Gumma, M.K.**, Dheeravath, V., Yafit, C., Naftali, G., Eyan, B., Victor, A., Jagath, V. and Anputhas, M., 2009. Water productivity mapping using remote sensing data of various resolutions to support "more crop per drop". *Journal of Applied Remote sensing*. Vol. 3, 033557 (2009). DOI:10.1117/1.3257643.
23. **Gumma, M.K.**, Thenkabail, Prasad S., Gautam, N. C., Gangadhara Rao, T. P., Velpuri, N.M. 2008. Irrigated area mapping using AVHRR, MODIS and LANDSAT ETM+ data for the Krishna River Basin, India. *Technology Spectrum*, 2(1): 1-11.
24. Gaur, A., T.W. Biggs, **Gumma, M.K.**, GangadharaRao, P, and H. Turrall., 2008. Water scarcity effects on equitable water distribution and land use in Major Irrigation Project – A Case study in India. *Journal of irrigation and Drainage Engineering*, 134 (1): 26-35.

25. T.P.G.Rao, I.V.Muralikishna, **Gumma, M.K.**, and Thenkabail,P.S. 2008. Mapping Irrigated area using Spectral Matching Techniques and Sub Pixel Decomposition Techniques in the Krishna River Basin, India. *Technology Spectrum*, 2 (3):32-45. Dec 2008.
26. Platonov.,A Thenkabail, P.S., Biradar, C.M., Cai, X., **Gumma, M.K.**, Dheeravath, V., Y. Cohen, V. Alchanatis, N. Goldshlager, E. Ben-Dor, J. Vithanage, H. Manthrilake, Sh. Kendjabaev, and S. Isaev. 2008. Water Productivity Mapping (WPM) using Landsat ETM+ Data for the Irrigated Croplands of the Syrdarya River Basin in Central Asia. *Sensors Journal*, 8(12), 8156-8180;
27. Thenkabail, P.S., GangadharaRao, P., Biggs, T., **Gumma, M.K.**, and Turrall, H., 2007. Spectral Matching Techniques to Determine Historical Land use/Land cover (LULC) and Irrigated Areas using Time-series AVHRR Pathfinder Datasets in the Krishna River Basin, India. *Photogrammetric Engineering and Remote Sensing*. 73(9): 1029-1040. **WINS 2008 John I. Davidson ASPRS President's Award from the American Society of Photogrammetry and Remote Sensing (ASPRS).**
28. Thenkabail, Prasad S., Biradar, C M., Noojipady, P., Xueliang, Cai, Dheeravath, V. **Gumma, M.K.**, Li, Y. J., Velpuri, M., Pandey, Suraj. 2007. Sub-pixel area calculation methods for estimating irrigated areas. *Sensors*, 7: 2519-2538.
29. Biggs, T., Thenkabail, P.S., **Gumma, M.K.**, Scott, C.A, GangadharaRao, P., and Turrall, H., 2006b.. Irrigated area mapping in heterogeneous landscapes with MODIS time series, ground truth and census data, Krishna Basin, India. *International Journal of Remote Sensing*. 27(19):4245-4266. **(One of the paper in best five papers in IWMI 2006).**

Review:

30. **Gumma, M.K.**, and Pavelic, P. (accepted). Identifying groundwater potential zones across Ghana using Remote sensing techniques. *Environmental monitoring and Assessment* (accepted).
31. **Gumma, M.K.**,Thenkabail, P.S, Nelson, A, Aileen, M, Islan, S (review)Mapping seasonal rice in a high cropping intensity environment of Bangladesh using MODIS time-series data and spectral matching techniques. *ISPRS Journal of Photogrammetry and remote sensing*. (submitted in Feb2012)
32. Thenkabail, P.S and **Gumma, M.K.**, (review) *Hyperspectral- Vegetation Indices (HVI) and Narrowbands (HNBS) To Understand, Model, and Map Major World Agricultural Crops in Support of Global Food Security and HypIRI Mission. IEEE Applied Earth Observations and Remote Sensing. (Submitted in Mar2012).*
33. **Gumma MK**, Mohanty S, Nelson A, Rala A, and Das SR (review) Improving Rice Production in Odisha: A Key to Achieving India's Future Food Security. PLoS ONE. (Submitted in Apr2012).

Preparation:

- **Gumma, M.K.**, and Andrew, N.,. (Prep). Mapping rice areas responses to drought in South Asia using multi temporal data. (Preparation).
- **Gumma, M.K.**, Andrew, N. et al., (prep) Spatial distribution of rice cropping system with season wise in Sri Lanka using MODIS time series data, field plot information with Spatial Models. (Preparation).
- **Gumma, M.K.**, Kajisa, K, Andrew, N.,et al (prep) Mapping cropland changes over the years due to climate changes of Tamil Nadu in South India (Preparation).
- **Gumma, M.K.**, and Andrew, N., (prep). Mapping rice areas responses to Submergence in South Asia using multi temporal data. (Preparation).

Academic books:

34. **Murali Krishna Gumma** and Prasad S. Thenkabail. 2011. Methods and Approaches of irrigated area mapping using Remote Sensing. LAP LAMBERT Academic Publishing GmbH & Co. KG Dudweiler Landstr. 99, 66123 Saarbrücken, Germany. Schaltungsdienst Lange o.H.G., Berlin Books on Demand GmbH, Norderstedt Reha GmbH, Saarbrücken Amazon Distribution GmbH, Leipzig. ISBN: 978-3-8443-1099-3Pp. 134.

Research Reports:

35. Biggs, T.W., Gaur A, Scott CA, ; Thenkabail, P.S. Rao, P.G., **Gumma. M.K**, Acharya, S., Turrall, H. 2007. *Closing of the Krishna Basin: irrigation, streamflow depletion and macroscale hydrology*. Colombo, Sri Lanka: International Water Management Institute (IWMI). 38p. (IWMI Research Report 111).
36. Barry, B.; Kortatsi, B.; Forkuor, G.; **Gumma, M. K.**; Namara, R.; Rebelo, L-M.; van den Berg, J.; Laube, W. 2010. *Shallow groundwater in the Atankwidi Catchment of the White Volta Basin: Current status and future sustainability*. Colombo, Sri Lanka: International Water Management Institute. 30p. (IWMI Research Report 139). doi:10.5337/2010.234

Conference & other papers:

37. Thenkabail, P.S., **Gumma, M.K.**, 2012 Towards A Landsat Hyperspectral Imaging Sensor (HIS) to Understand, Model, and Map Major World Agricultural Crops in Support of Global Food Security and HypsIRI Mission. *Agro-Geoinformatics2012*. 13, 2012.
38. Thenkabail, P.S., **Gumma, M.K.**, 2012 Global croplands and their water use for food security in the 21st century through advanced Remote sensing. *Agro-Geoinformatics2012*. 14, 2012.
39. **Gumma, M.K.**, Thenkabail, P.S., and Velpuri, N.M., 2009. Vegetation Phenology to Partition ground water from surface water irrigated areas using MODIS 250m time series data for the Krishna river basin (India) *International Association of Hydrological Sciences. IAHS PUBL. 330, 2009*.
40. **Gumma, M.K.**, I.V. Murali Krishna and Thenkabail, P.S., 2009. Methods & approaches for irrigated area mapping and land use changes at various resolutions for Krishna river basin, *GIS for CIVIC Amenities*, 2009.
41. **Gumma, M.K.**, Biggs, T. Thenkabail, P.S., and Gangadhara Rao, P. 2006. Irrigated Area Mapping in Krishna River Basin using MODIS 500-m Time-series Data. International Conference on Geo Informatics for Rural development (*ICORG-2006*) India.
42. Gaur A., T. W. Biggs, **Gumma, M.K**, Hugh Turrall, and P.G. Rao. 2006. Implications of Spatial Distribution of Canal Flows from a Multipurpose Reservoir on Irrigated Areas and Land Use Patterns. Working conference on enhancing equitable livelihood benefits of dams using decision support systems. Nazareth, Ethiopia, 23-26 January 2006.
43. Thenkabail, Prasad S.; Biradar, Chandrashekhar M.; Noojipady, P.; Dheeravath, Venkateswarlu; Li, Yuan Jie; Velpuri, M.; Reddy, G. P. O.; Cai, Xueliang; **Gumma, Murali Krishna**; Turrall, Hugh; Vithanage, Jagath; Schull, M.; Dutta, R. 2008. *A Global Irrigated Area Map (GIAM) using remote sensing at the end of the last millennium*. Colombo, Sri Lanka: International Water Management Institute (IWMI) 62p.
44. Obi Reddy, P. G., Thenkabail P.S., Biradar, C.M., Dheeravath, V., Noojipady, P., Velpuri, M., and **Gumma, M.K.** 2006. Irrigated Areas of India based on Satellite Sensors and National Statistics: Issues and

Way forward from Global Irrigated Area Mapping (GIAM)-2006. *International Workshop on Global Irrigated Area Mapping*, September 25-27, 2006, Colombo, Sri Lanka

Book Chapters:

45. Thenkabail, P.S., Biradar, C.M., Noojipady, P., Dheeravath, V., **Gumma, M.K.**, Li Y.J., Velpuri, M., Reddy, G.P.O., and Cai, X. L. 2008 Global Irrigated Area Maps (GIAM) and Statistics using Remote Sensing, GIAM book chapters. (CRC Press- Taylor and Francis). Pp. 450+. (in press/accepted; expected to be released in July, 2009).
46. Biradar, C. M.; Thenkabail, P. S.; Noojipady, P.; Dheeravath, V.; Velpuri, M.; Turrall, H.; Cai, Xueliang; **Gumma, Murali Krishna**; Gangalakunta, O. R. P.; Schull, M. A.; Alankara, Ranjith D.; Gunasinghe, Sarath; Xiao, X. 2009. *Global map of rainfed cropland areas (GMRCRA) and statistics using remote sensing*. In Thenkabail, P. S.; Lyon, J. G.; Turrall, H.; Biradar, C. M. (Eds.). Remote sensing of global croplands for food security. Boca Raton, FL, USA: CRC Press. pp.357-389. (Taylor & Francis Series in Remote Sensing Applications).
47. Thenkabail, P.S., Munir A.H., Dheeravath, V. and **Gumma, M.K.**, 2011. Global croplands and their water use Remote sensing and non-Remote sensing perspectives. (Page no. 383-416). Edited by Qihao Weng. *Advances in Environmental Remote Sensing: Sensors, Algorithms and application*, USA: CRC Press. Taylor & Francis Series in Remote Sensing Applications.

11.0 Conferences/workshops/invited lectures

Made significant contributions in preparation of workshop materials for the following:

ICAR, Delhi, India, April 11-13th, 2012. STRASA Phase 2 – Inception and planning workshop. Stress tolerant rice for Africa and Asia (Phase 2). I was presented “Characterization of stress prone areas in rice growing areas: A study on South Asia (year 2010)”.

ESRIUC, San Diego, CA, USA, July 11th-15th, 2011. ESRIUC – presented “Mapping Complex rice-cropping pattern in Bangladesh using MODIS time series data”

BRRI, Dhaka, Bangladesh, April 09th, 2011. STRASA – Inception and planning workshop. Stress tolerant rice for Africa and Asia (Phase 2). I was presented “Temporal rice growing areas in Bangladesh using Remote sensing data”.

ICAR, Delhi, India, April 05-07th, 2011. STRASA – Inception and planning workshop. Stress tolerant rice for Africa and Asia (Phase 2). I was presented “Characterization of stress prone areas in rice growing areas: A study on South Asia (year 2010)”.

Ranchi, Jharkhand, India, March 12-13th, 2010. STRASA - Drought annual review meeting. I was presented “Characterization of drought areas using Remote sensing data in South Asia (year 2009-10)”.

Lucknow, Uttar Pradesh, India, March 9-10th, 2010. STRASA - Submergence annual review meeting. I was presented “Characterization of submergence areas using Remote sensing data in South Asia”.

IRRI, Philippines, Feb 12th, 2010. STRASA annual meeting. I was presented “Rice mapping using advanced Remote sensing methods for South Asia.

Institute of Engineers, India, Nov 19th, 2009. GIS for CIVIC Amenities. I was presented “Methods & approaches for irrigated area mapping and land use changes at various resolutions for Krishna river basin.

CV of Dr. Gumma Murali Krishna, Collaborative Research Scientist, IRRI

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Colombo, Sri Lanka, Nov 3rd, 2009. IWMI Annual review meeting. I was presented Spatial models for site selection of inland valley wetlands for rice cultivation in Ghana.

Delhi, India, Sept 19th, 2009. Work shop on Water allocation in the Krishna River basin to improve Water Productivity in Agriculture. IWMI/ACIAR cooperative program, I was one of key contributor for workshop.

Hyderabad, India, Sept 6-12th, 2009. IAHS/IAH conference on Groundwater studies. I was presented Vegetation Phenology to Partition ground water from Surface water irrigated areas using MODIS 250 meter time-series data for the Krishna River Basin.

Accra, Ghana, Feb 24-25, 2009. Work shop on Sustainable development and Dissemination of lowland Rice and paddy fields in Inland valleys of West Africa 2009. IWMI/Japan Cooperative Program. I was one of scientific lead organizing the workshop.

Accra, Ghana, July 1-25, 2008. Shallow Ground water irrigated area mapping with focus on Ghana, Burkina-Faso (SGI – Ghana) Ground Truth mission training workshop. As invited by IWMI-GLOVA, gave 14 days training on “Groundtruth for Shallow Ground Water Irrigated Area Mapping with Focus on Ghana (SGI Ghana): Goals, Strategies, Methods, and Approaches of Collecting Groundtruth Data for SGI 30m”.

Accra, Ghana, Nov 28-Dec11, 2007. Transferring Effective Irrigation and Water Resource Management Technique (TEIWRMT) held in Ghana 2007. IWMI/Japan Cooperative Program. I was one of scientific lead organizing the workshop. About 30 participants from various Governmental and Academic Institutes attended the 2-day workshop, gave 6 day training on “Ground truth for Inland valley mapping-suitability of rice cultivation (IVs Ghana): Approaches and methods and collecting the ground truth data for Kumasi and tamale.

Beijing, China, September 9-14, 2007. Global irrigated area mapping with focus on China (GIAM – China) Ground Truth mission training workshop. As invited by Chinese Academy of Agricultural Sciences (CAAS), gave four-day training on “Groundtruth for Global Irrigated Area Mapping with Focus on China (GIAM China): Goals, Strategies, Methods, and Approaches of Collecting Groundtruth Data for GIAM 30m”. Around 20 participants from CAAS, Chinese Academy of Sciences (CAS) and China Agricultural University (CAU) received the training.

Beijing, China, May 23, 2007. Global irrigated area mapping (GIAM) workshop for China (GIAM China) held in Beijing on May 23, 2007. The International Water management Institute (IWMI) and the Chinese Academy of Agricultural Sciences (CAAS) workshop on GIAM. I was the scientific lead conducting the workshop. About 50 participants from CAAS, Chinese Academy of Sciences (CAS), and academic and governmental institutes attended the 1-day workshop.

New Delhi, India, April 13, 2007. Global irrigated area mapping (GIAM) workshop for India (GIAM India) held in New Delhi, 2007. The International Water management Institute (IWMI) and the Indian Council for Agricultural Research (ICAR) workshop on GIAM. I was one of scientific lead conducting the workshop. About 70 participants from various Indian Governmental and Academic Institutes attended the 1-day workshop.

Colombo, Sri Lanka. September 25-27, 2006. International workshop on Global Irrigated Area Mapping (GIAM). This workshop was attended by 70 participants from 16 countries including representatives from USGS, NASA, Yale University, and University of North Dakota. I lead the scientific and organizational aspects of this workshop.

GIS applications in Micro Planning-2004 National Institute of Rural Development (NIRD), Rajendranagar, Hyderabad.

Conference on Geomatics-2003 Institute of Engineers, Hyderabad, India

Digital Geography and Education Andhra Pradesh Geographical Societies exhibition, Jan 2002, Hyderabad)

Research papers in Conferences

Water Productivity mapping methods and protocols using Remote sensing to support growing more crop per drop. Thenkabail, P.S., Biradas, C., Platanov, M., **Gumma, M.K.**, and Dheeravath, V..2008 Presented in **PECORA17** Memorial Remote Sensing Symposium, Denver, Colorado, USA.

Sub-Pixel area (SPA) Computation methods. Thenkabail, p.S., Biradas, C., Noojipady, V., **Gumma, M.K.**, Dheeravath, V.Y.J.Li., Velpuri, M.2008 Presented in **PECORA17** Memorial Remote Sensing Symposium, Denver, Colorado, USA.

Global Irrigated Area Map (GIAM) and Global Map of Rainfed Cropland Areas (GMRCRA) at the end of last Millennium Using Time-series Remote Sensing 2008. Thenkabail, P.S., Biradar, C.M., Noojipady, P., Dheeravath, V., **Gumma, M.**, Li, Y.J., Velpuri, M., Reddy, G.P.O. Cai, X. L., Turrall, H.. Presented in **PECORA17** Memorial Remote Sensing Symposium, Denver, Colorado, USA.

GIAM -Discussion on Scale Issue. 2006. Velpuri, M., Muralikrishna, G., Thenkabail, P.S, Biradar, C.M., Noojipady, P., Obi Reddy, G.P., Dheeravath, V., Li, Y.J., Cai, X., Vithanage, J. Rishiraj, D., Edussuriya, C., Gunasinghe, S. and Alankara, R.IWMI. An Interactive Sessions. International Workshop on Global Irrigated Area Map (GIAM) September 25-27, 2006, Colombo, Sri Lanka.

Water allocation in the Krishna River basin to Improve water productivity in Agriculture areas, **Muralikrishna Gumma**, Anju Gaur, and Trent Biggs. Presented in IWMI-TATA Conference 2006.

Irrigated Area Mapping in Krishna River Basin using MODIS 500-m Time-series Data **Muralikrishna Gumma.**, Biggs, T. Thenkabail, P.S., and Gangadhara Rao, P. Presented in International Conference on Geo Informatics for Rural development (**ICORG-2006**) Rajendranagar, Hyderabad.

Mapping Irrigated Areas using Spectral Matching Techniques (SMTs), Thenkabail, P.S, GangadharaRao, **Muralikrishna Gumma** and Biggs, T., Presented in International Conference on Geo Informatics for Rural development (**ICORG-2006**) Rajendranagar, Hyderabad.

Identification of Most Sensitive MODIS bands for Irrigated Areas or Computation of new Narrow-Band MODIS Vegetations Indices. Thenkabail P.S, Noojipady P., Biradar C.M., **Muralikrishna Gumma.**, and GangadharaRao, Presented in International Workshop on Global Irrigated Area Mapping (**GIAM-2006**), IWMI, Colombo.

12.0 Referees

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