Geoinformational Support

Geo4IRBM

for Integrated River Basins Management

esa

European Space Agency

Introduction of Geoinformational support for Integrated River Basins Management - Geo4IRBM

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Geo4IRBM project consortium

GEOSYSTEMS Polska (Warsaw, Poland) is a provider of geospatial solutions and technologies designed for data acquisition, analysis and presentation. The company conducts R&D projects in the field of remote sensing, photogrammetry and geographical information systems and implements their achievements as operational applications. The Geo4IRBM project leader.

Topologic Consulting (Warsaw, Poland) offers spatial analytics and EO satellite monitoring services applicable in various sectors of economy and branches of administration. The company provides consulting and advisory services, assisting its partners during definition of scenarios of implementation of innovative decision supporting solutions

Institute of Geodesy and Cartography (IGiK) (Warsaw, Poland) carries out research and applied works in the field of surveying and mapping and related disciplines for science, geodetic and cartographic practice for the needs of state and local governments, national security, as well as for surveying and cartographic enterprises.

Geo4IRBM project basics

Project financed by European Space Agency under Polish Industrial Incentive Scheme

esa
European Space Agency
Agence spatiale européenne

Project duration:

12 months: July 2018 – June 2019 (possible extension until the end of 2019)

Technical objectives:

The aim of the project is rapid elaboration and provision of certain informational products and services, which will be further used for the needs of support of selected river basins management.

The project goals were described in cooperation with the Jakarta, Indonesia, office of the Asian Development Bank (ADB) and reflects both requirements of the end-user organisation and the project consortium's assessment of feasibility in the frame of short service provision time.

9
products and services lines

22.000km^2
total service area

2
separate areas of interest

Geo4IRBM project idea

Why geoinformational support?

Geographic Information System (GIS) is a system designed to capture, store, manipulate, analyse, manage, and present spatial or geographic data. GIS applications are tools that allow users to create interactive queries (user-created searches), analyse spatial information, edit data in maps, and present the results of all these operations.

One of sources of data and information for GIS is Remote Sensing

Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object and thus in contrast to on-site observation, especially the Earth. Generally refers to the use of satellite- or aircraft-based sensor technologies to detect and classify objects on Earth, including on the surface and in the atmosphere and oceans.

In Geo4IRBM

- spatial data fusion methods used
- spatial modeling applied
- tools for storage and publication or geospatial data implemented
- geospatial products and services developed
- analytical applicational scenarios defined

Satellite EO is the major source of data

Mainly the Copernicus programme

Geo4IRBM project idea

What is the Integrated River Basin Management?

Integrated understanding

- natural resources of a river basin are integrated
- hydrologic boundaries are more important for natural processes than administrative
- competition and conflicts for water resources are immanent part of coexistence
- orientation at planning and management
- balance of natural and economic costs and benefits is the ultimate goal

Integrated management

- establishment of network of cooperating institutions
- communities and local stakeholders involvement in all the process
- recognition and monitoring of natural resources and human activities in the basin
- elaboration of strategies and operational tools of their implementation and monitoring of implementation

In Geo4IRBM

Collection and maintenance of valuable information on basin resources

Supporting tools for policies definition and implementation

Information sharing as a mean increasing cooperation between administration branches and local communities inclusion

Geo4IRBM Areas of Interest

Cimanuk-Cisanggarung rivers watershed

area of the watershed: 7 795 sqkm,

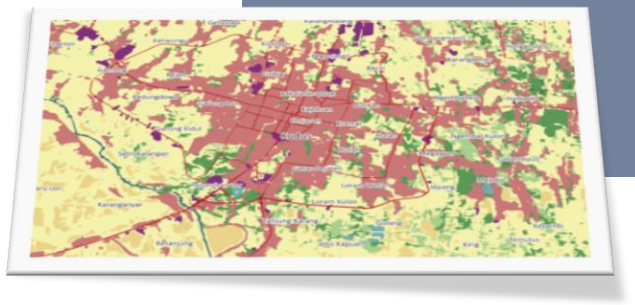
area with 5 km buffer: 10 575 sqkm.

Jratunseluna river watershed

area of the watershed: 9 367 sqkm,

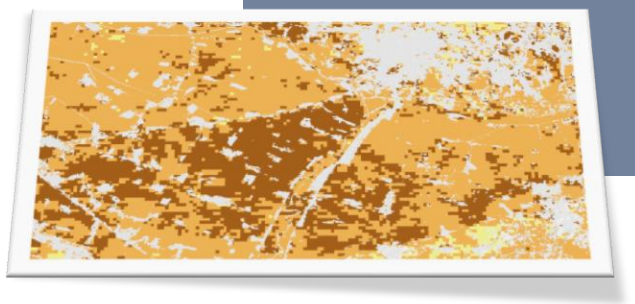
area with 5 km buffer: 12 706 sqkm.

Geo4IRBM products and services catalogue



Land Cover Mapping assures information of spatial distribution of specific land cover types

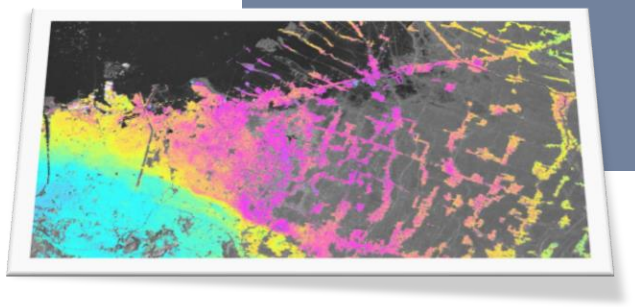
Land Cover Changes Mapping contains information of spatial distribution of specific land cover classes, datasets represent subsequent land cover maps, for 1975, 1990, 2000 and 2018.



Cropping Intensity Mapping provides information indicating number of harvests/crops for agriculturally cultivated land (with crops types not differentiated) during the year of monitoring.

Geo4IRBM products and services catalogue

Surface Water Monitoring Service provides spatial representation of detected surface water extent store and integrate results of analysis on three levels: for individual S1 scenes, individual passes, and for individual days.



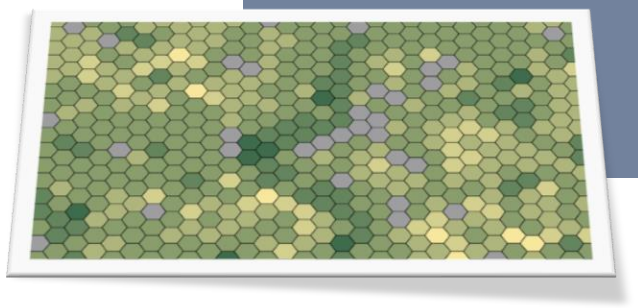
Surface Deformation Service contains information on surface deformation: map of mean deformation in cm/year and deformation history for every persistent and distributed scatterers

Potential Soil Erosion Maps provide information of potential soil erosion in tons per hectare per year. Sediment Yield Maps provide information amount of sediment in tons per hectare per year that is transported to a basin outlet.

Geo4IRBM products and services catalogue

Costal Changes Mapping provides line features representing coastlines as were observed on subsequent satellite datasets for 1975, 1990, 2000 and 2018

Long-term Surface Water Coverage Mapping generates data on spatial representation of frequency of detection of surface water.



Ecosystems and Biodiversity Mapping provides information on ecosystems type, biodiversity, ecosystem primary production during the year of monitoring.

Summary of understanding of the EWSIP project informational needs in respect to Geo4IRBM

PPTA requirements *(source: PPTA task force)*

Objective

To evaluate historical changes in Water/flood extent, Land Use and Land cover in 4 basins in Indonesia; Cimanuk, Seluna, Mahakam, and Belewan.

Processes

Evaluation of Water inflows to reservoirs in Raw Water Supply (RWS) subprojects,

Evaluation of Water/flood extent in Flood Risk Management (FRM) subprojects.

Data sets requested

Cross analysis of flood events on the base of existing reports and as detected by historical surface water monitoring (1-month before and 1-month after the date)

(i) Water/flood extent – also for the period before S1 mission (ii) Land cover and (iii) Land Use (if available) through Landsat-8 and Sentinel-1 images at the basin scale.

Products for assessments along the coast-line.

Information on cropping intensity

Proposed application scenarios of Geo4IRBM services

Land Cover Maps and Land Cover Changes maps applied for the needs of EWSIP focusing

Coastline changes elaborated on the base of Land Cover Changes maps. Indicators of coastline length variations in reference network.

Surface deformation / subsidence along the coastline, cross analysis of coastline changes.

Surface deformation for the needs of landslides detection and erosion assessment useful for floods forecasting.

Surface waters monitoring historical data could contribute to historical floods delimitation and as information on frequency of water coverage, proposed extension of the period before S1 operation.

Crops Intensity Maps for water demand assessment.

Proposition of extension of AOIs was rejected due to resources limitation (proposed extension area was 5 times bigger than the original)

Summary of understanding of the EWSIP project informational needs in respect to Geo4IRBM

Enhanced Water Security Investment Project *(source: EWSIP Project Concept Paper)*

Outputs

1. Planning for water resources optimized
    - 1a. Water monitoring equipment installed as per rationalization plans.
    - 1b. River basin wide hydrological and hydrodynamic models calibrated.
    - 1d. Asset management information system for river assets established.
    - 1e. Knowledge and skills in climate resilient infrastructure design/planning of RBO staff

Key Activities with Milestones

1. Planning for water resources optimized
    - 1.2 Install and calibrate expanded networks of hydro-meteorological stations. (Q4 2020)
    - 1.3 Run hydrological and hydrodynamic models to optimize water management for DMI, irrigation and energy needs taking into account land use change and climate change scenarios. (Q2 2020)
    - 1.5 Upgrade the river asset management information system to an online GIS based system. (Q2 2020)

Proposed application scenarios of Geo4IRBM services

Land Cover Maps applied for the needs of flood risks and flood hazard (the Polish case IMGW/Polish Waters/Ministry of Inland Navigation and Water Management).

Crops Intensity Maps for water demand assessment.

Surface Waters Monitoring historical data could contribute to climate change analysis and historical floods delimitation - frequency of water coverage

Summary of understanding of the EWSIP project informational needs in respect to Geo4IRBM

Enhanced Water Security Investment Project *(source: EWSIP Project Concept Paper)*

Outputs

2. Raw water supply infrastructure and services improved
    2a. Water storage is increased
    2c. Additional groundwater wells built or upgraded worse than expected ground conditions may cause implementation delays)

Key Activities with Milestones

2. Raw water supply infrastructure and services improved
    2.4 Construct or upgrade bulk water facilities (reservoirs, ponds, bunded reservoirs, groundwater wells, conveyance) including climate resilient design features. (Q1 2022)

Proposed application scenarios of Geo4IRBM services

Land Cover Maps applied for the needs of investments strategic planning

Surface Water Monitoring service inputs for the reservoirs effectiveness and responsiveness evaluation.

Ground conditions analysis could be supported with interferometric analysis of ground subsidence.

Summary of understanding of the EWSIP project informational needs in respect to Geo4IRBM

Enhanced Water Security Investment Project *(source: EWSIP Project Concept Paper)*

Outputs

3. Flood risks management enhanced

   3a. Early flood warning systems operational.

   3c. Coast protection infrastructures rehabilitated or upgraded and climate proofed.

Key Activities with Milestones

3. Flood risks management enhanced

   3.4 Construct or upgrade flood infrastructure, coast protection and urban drainage systems including climate resilient design features. (Q1 2022)

   3.5 Design and conduct gender-inclusive awareness raising campaigns (Q4 2020)

   3.6 Develop flood warning systems and raise awareness of floodplains communities through gender inclusive approach and outreach strategy. (Q4 2020)

Proposed application scenarios of Geo4IRBM services

Surface water monitoring as an element NRT of real time data acquisition at basin level.

Coastline changes maps elaborated on the base of Land Cover Changes maps. Indicators of coastline length variations in reference network.

Surface deformation / subsidence along the coastline, cross analysis of coastline changes.

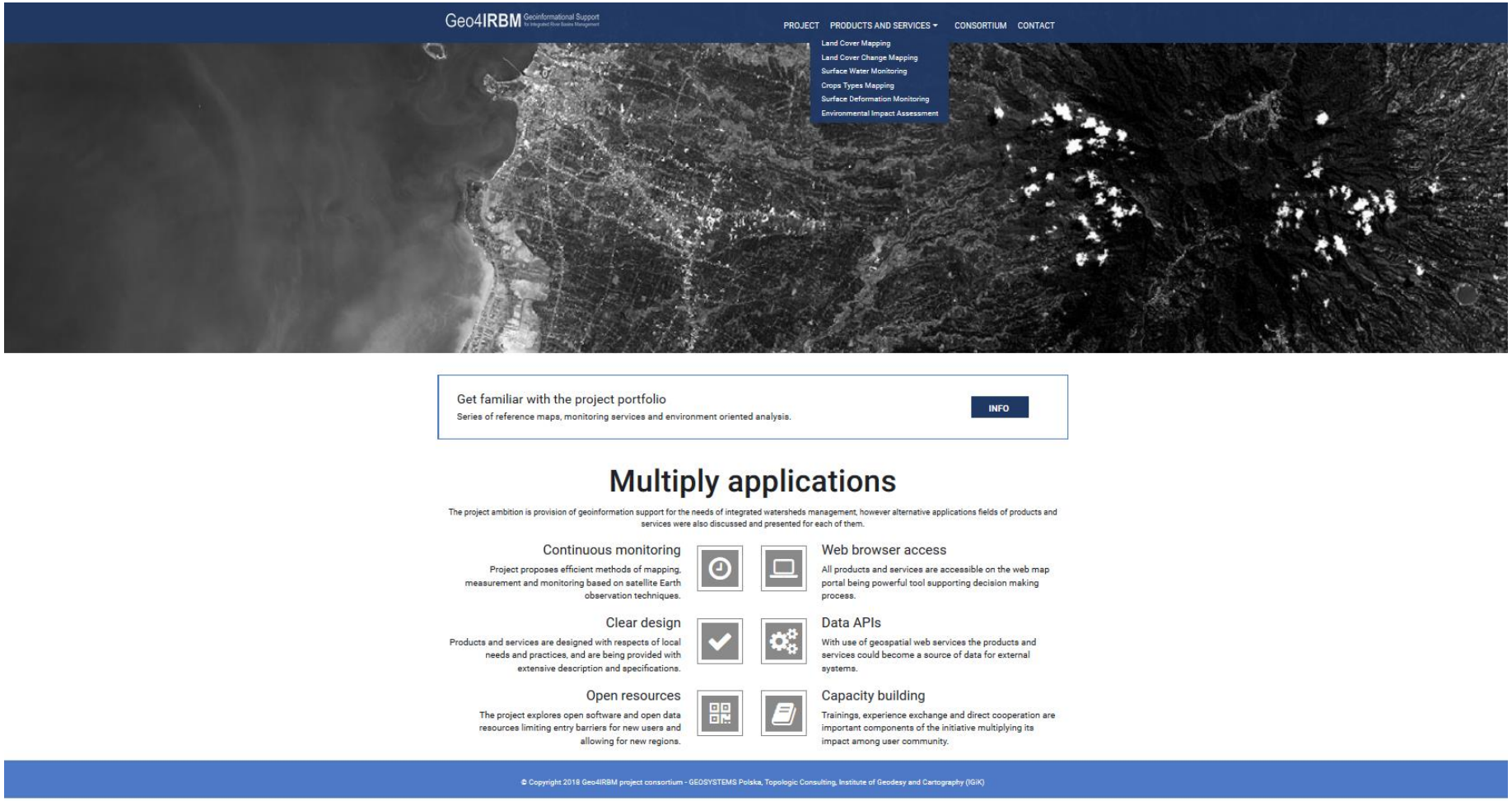
Surface deformation for the needs of landslides detection and erosion assessment useful for floods forecasting.

Soil erosion modelling applicable for floods forecasting.

Geo4IRBM project website – information and contact

https://geo4irbm.eu/

info@geo4irbm.eu



Invitation for discussion

We invite you to discussion and cooperation, we are open to:

Products sharing and experience exchange

Continuation of monitoring

Further development of products and services – new data sources, new methods

Detailed definition of application scenarios in reference to actual practices

Adaptation of products and services to application scenarios

Development of interfaces (GUIs and APIs) accordingly to identified needs

Extension of service area

Extension of thematic scope of the products and services catalogue

…in response to your feedback