Value in EO Workshop

Measuring the Socio-Environmental Impacts

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Focussing on socio-environmental benefits

	ECONOMIC	ENVIRONMENTAL	REGULATORY	INNOVATION & ENTREPRENEURSHIP	SCIENCE & TECHNOLOGY
Farming in Denmark	★★★	★★★	★★★	★★★★★	☆
Flood management in Ireland	★★★	★★	☆	★	☆
Ice navigation off Greenland	★★★★	★★	★	☆	★★★
Farming in Poland	★★★	★★★	★★★	★★★★★	★
Winter navigation in the Baltic	★★★★★	★	★	☆	☆
Forestry management in Sweden	★★★	★★	★★★★★	★★	★★
Infrastructure management in the Netherlands	★★★★	★	★	★★★	★
Growing potatoes in Belgium	★★★	★★★	★★	★★★	★★★

What have we done to measure such benefits

- In SEBS, we have systematically tried to **understand socio-environmental benefits <u>associated</u> with the use of Sentinel-enabled services**

- In practice, **socio-environmental impacts are primarily felt at the far end of the value chain** → thus our focus was to establish links with the availability of Sentinel data at the entry point of the chain ("**looking inside the black box**")

- This has been **pursued through interviews with researchers and practitioners in relevant institutions** (e.g. Hydrology, Eco-toxicology, etc.) and complemented by desk research (led by IIASA)

	TIER 1	TIER 2	TIER 3	TIER 4
Services	BLACK BOX		**Package of agricultural support services**	**Food quality, reduced water and air pollution from agriculture**
Beneficiaries			Selected farmers using Grupa Azoty products	Citizens, Governmental Agencies looking into environmental protection
			volved in food security (e.g. EFSA) *nmental impact of agriculture (e.g. ity of Lodz – Eco-Hydrology dept.)*	
Type of Benefit			(i) Better decision making on the farm leading to greater input use efficiency and cost savings; (ii) value-adding service	Environmentally friendly food production, reduction of water and air pollution (e.g. NOx)
Manifestation of value			Retaining or expanding customer base	Improved health of rural populations, higher, better state of ground water and waterways, cleaner air

Measuring socio-environmental benefits

Category	What it can mean	Specific Examples of Indicators	How we measured it
Reduced pollution (RP)	Reduced amounts of pollutants in key resources (e.g. water or air)	Reduced usage of fertilisers Reduced usage of pesticides Reduced usage of fuel Reduced emissions	Stakeholders estimations of usage of pesticides/fertilisers Stakeholder estimations of reduced travels and fuel consumption
Improved public health (IPH)	Less toxicological risk	Hospitalisation rate in association with environmental events/risks	We have not attempted to measure this yet
Reduced impact on natural resources (RR)	Improved preparedness or response to flooding	Reduced erosion Reduced impact on habitats Reduced “unsocial” logging	We have not attempted to measure this yet
Common Understanding (CU)	Maps that provide a common point of reference on a phenomenon	Better communication between EM authorities Better compliance of public to instructions	Expert opinion on reduced transmission of erroneous information in media outlets

Environmental Benefits across the cases

Environmentally friendly Agriculture

→Reduced use of inputs (fertilisers and pesticides)

→ Decreased risk of pollution to watercourses (see eutrophication and loss of aquatic life)

More efficient ship routing

→Reduced use of fuel

→Reduced risk of accidents and potential oil spills

Increased preparedness/response capacity wrt to disasters

→Minimising damages associated with natural or man-made disasters

→ Reducing the loss of wildlife, erosion, pollution, damage to habitats, etc.

Other societal benefits we have encountered

Common understanding – The ability to convey information in an easily understandable manner is critical for the effectiveness of certain operations

- **Prime example:** In Ireland, the use of **flood delineation maps**, allowed disaster management actors, politicians, journalists and citizens to effectively communicate on the impact and evolution of the floods

Whereas in previous events:

"The main difficulty in this case was a disjoint between the meteorological and the hydrological system information, the failure to convert this into a coherent picture of what might happen, and then communicate this assertively to the relevant public as a specific flood warning."

Source: NDFEM, Report on the review of the response to exceptional severe weather events of 2009 – 2010

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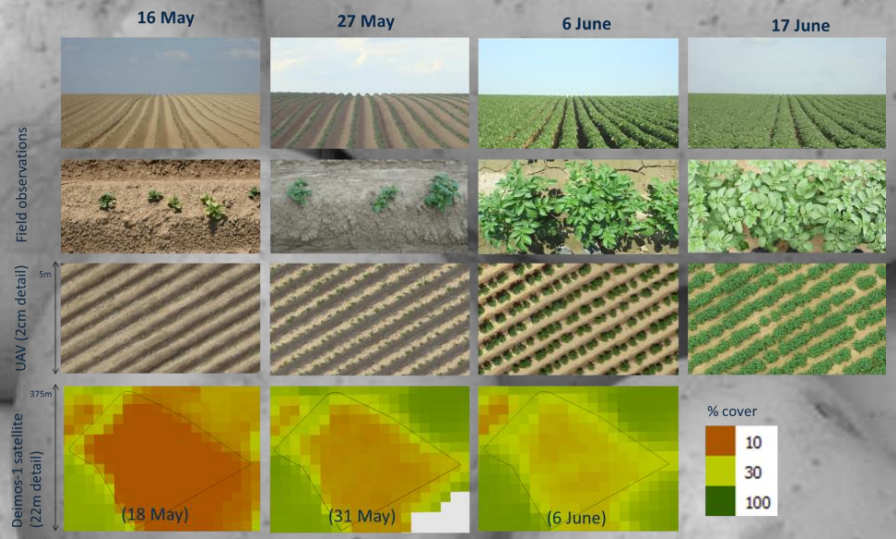
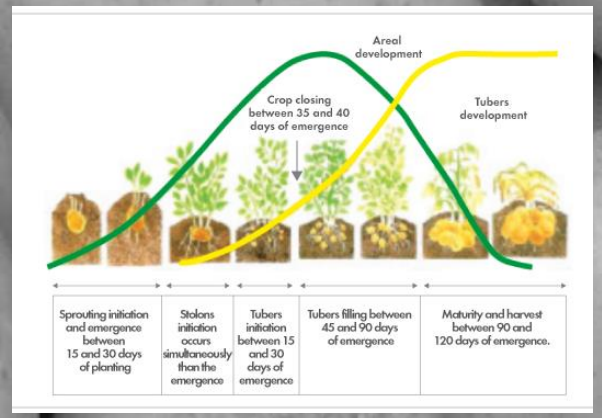
Measuring the Socio-Environmental Impacts

Steven Krekels, VITO

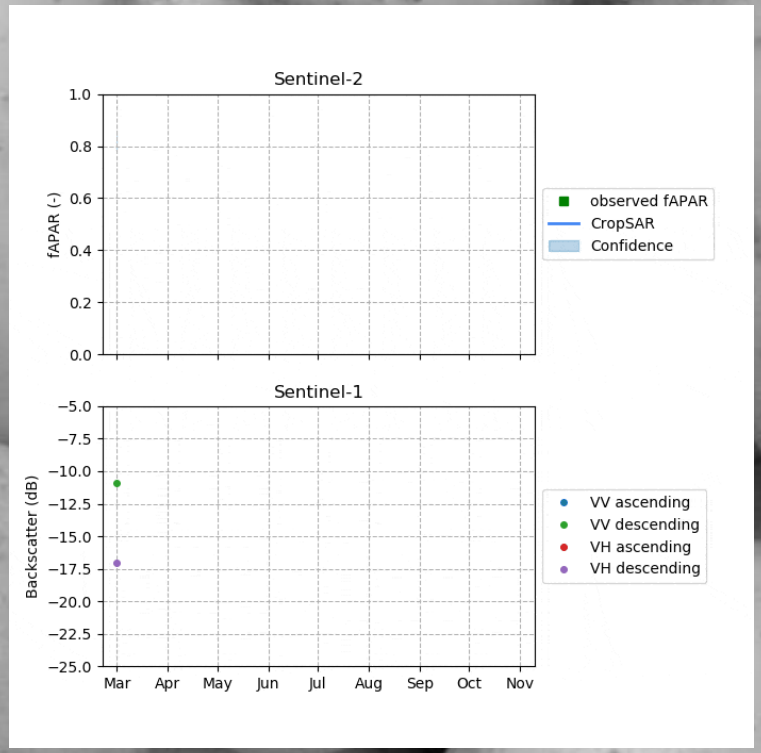
WatchItGrow : crop monitoring with Sentinels

A digital platform for the entire value chain





Looking through the clouds with **CropSar**



More on WatchItGrow https://watchitgrow.be/en
More on CropSar https://blog.vito.be/remotesensing/cropsar2019

WatchItGrow : crop monitoring with Sentinels

Interests	Input Suppliers	Credit & Finance	Farmers	Traders	Food Processors	Retailers	Consumers
Problems	Purchasing capacity farmers	Agri = Risks	Climate Change Information gap Soil Nutrients	Unstable quality & yields	Sustainable sourcing	Critical consumers	Food Quality
Solutions	Supply Planner Crop Disease Alert	Risk-monitoring Credit Scoring	Grower Apps What–When-How Crop Disease Alert	Yield Prediction Planning & Optimization	Certification	Traceability	Tracer App
Impact	Higher quality input	Increase loan portfolio	Higher yield & income – higher efficiency of resources	Sustainable sourcing & supply	Sustainable supply of quality products	Reducing risk factors	Increased Trust

Applications adding value to all actors in the value chain

WatchItGrow : crop monitoring with Sentinels

A digital platform for agriculture

- Improve quality & quantity
- Rebalance profits via transparent information
- Deliver automatic crop advice via WatchITgrow
  - New insights / pattern detection using deep learning algorithms.
  - Combination of :
    - Remote sensing data
    - Meteo Data
    - Soil data
    - **Field Management data - parcel fiche!**
    - IoT data
  - Precision Agriculture to reduce fertilizers, irrigation…

Why potato?

- Per m2 & compared to rice
  - Feed more people
  - Consume less water
  - Emit less methane
- Economic activities for further processing
- Replacing staple food in quite some countries

Limitations and areas for improvement

- It is **hard to establish a measurable correlation, let alone causation**, between socio-environmental benefits at the end of the chain and the availability of Sentinel data at the start of it

- For some cases with clear environmental perspective (e.g. air quality monitoring) but **"composite" final products relying primarily on modelling**, it is hard to understand the value of satellite data

- Overcoming this limitation would require **heavier involvement of specialists/researchers** (e.g. hydrologists, eco-toxicologists, epidemiologists, etc.) in the studies

What have we learned – key findings

- The use of Sentinel-enabled services often brings **indirect yet not negligible** environmental and societal benefits to actors down the chain

- Socio-environmental benefits are not **(and certainly should not) be seen only as a by-product** of the use of a satellite-enabled service

  - In Poland, the farmer we interviewed was clear *"Even if my savings where not as large, I would still use services that allow me to do good for the environment"*

  - In Ireland, the authorities underlined that *"the use of Copernicus EMS maps helped significantly to build stronger trust among the citizens on our ability to handle the situation. This was further supported by the media, where reporters were using the flood delineation maps in their news stories. "*

Next steps and open questions

- We are **planning to analyse cases which should have direct socio-environmental impacts**, e.g. water or air quality monitoring, protection of biodiversity, etc.

Questions

- Would anyone in the audience be willing to undertake **complementary analyses of niche** (e.g. turlough monitoring) **or more complex** (e.g. correlation of algal blooms in the Baltic with agricultural activities in Poland) processes?

- Are there **any datasets (at local or national level) that could help us** in our efforts to solidify the socio-environmental part of our analyses?

- Have you developed **solid methodologies for the quantification of socio-environmental indicators**?

THANK YOU

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