QUICK SCAN INDONESIA

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Netherlands Space Office

The Quick Scan for Indonesia is commissioned by the Netherlands Space Office (NSO) within the framework of the Geodata for Agriculture and Water (G4AW) program. The following organizations have contributed to this document:

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INTRODUCTION

Within the framework of food security policy, the Ministry of Foreign Affairs of The Netherlands is implementing the programme 'Geodata for Agriculture and Water (G4AW) Facility'. The G4AW Facility aims to increase the agricultural sector output in G4AW partner countries. This is achieved by providing food producers with relevant information, advice and/or (financial) products through operational information chains using satellite data.

In the summer of 2014, a new call for tenders will be opened. In this call, the Ministry of Foreign Affairs of The Netherlands calls for good quality project proposals from viable partnerships.

Goal of the Quick Scan

The Quick Scan serves as input for preparing the country visit and the G4AW information and matchmaking workshop in Indonesia. In the workshop the local context, constraints and challenges in agriculture will be discussed. Furthermore, the background and details of the G4AW Facility is provided and the development of partnerships is promoted.

This Quick Scan provides an up-to-date information assessment on agricultural and associated activities. It provides information from different perspectives and in a wider context (climate, water management). Additional, stakeholders from different types of organizations are identified and reported. The document is initially supporting the country visits and workshop, but the provided information can also contribute to the development of partnerships that are intending to bring forward a proposal in the second call of the G4AW Facility.

1 Assessment of Indonesia with a focus on Agricultural issues

Pressure on the agro-eco production systems caused by increased (overpopulation), climate changes and extreme weather conditions lead to a lack of natural local resilience. In this section, the most important challenges in the agro-eco systems in Indonesia are given as well as an overview of (governmental) efforts to address the food security situation.

1.1 Main challenges in Indonesian Agro-eco systems

1.1.1 General challenges

Land less and small holder farmers located in different geographical location

Many farmers in rural areas have no land. They usually work for land owners who lives in urban areas under profit-sharing agreement in which the land owners will provide land and the farmers will provide the rest including seeds, fertilizers and labour. The sharing for rice farming is usually 50:50 whereas for horticulture it will be 75% for farmers and 25% for land owner. There is government law to regulate such agreement (Law Number 2 year 1960 on Profit Sharing Agreement) but most people are not aware of it anymore. Related to value chain, this condition has made it difficult to identify the target of the chain. Especially in Java, farmers usually have an average of 0.25 ha. This situation creates challenge in marketing the products to companies who require big amount of products. Not all farmers are members of cooperative or farmer groups. The unorganised farmers living in scattered location creates difficulties in marketing the products and in monitoring the quality of the crops.

Unavailability of extension workers

Department of Agriculture has extension workers to assist farmers in improving their productivity and crops quality. However, not all of them have the commitment to reach farmers in most isolated areas. With one extension worker to cover 2 to 4 villages, such job is not easy to complete especially in outside Java where the distance of one village to the other can be as 10 kilo meters away and separated by big river or forest. Report from some NGOs working for farmers, for instance in North Sumatra and Aceh, the extension workers are rarely visiting the farmers because they are not provided with transport allowance. And most of them are not permanent staff (not yet government staff)

Bad infrastructure – transportation, farming facilities

The majority agriculture areas in Indonesia are located in isolated areas with limited infrastructure such as road, market and bank.

Even when there is road connecting villages to sub-district, the road condition is not good enough. Sometimes it is only certain vehicles that can ride on the road. And certain areas especially outside Java, such public transport can only available on certain days, usually market days which can be twice a week. In Kalimantan, Maluku and Papua, the rural infrastructure are worse.

Access to market information

There are already information available provided by several institutions, government as well as non-government. For instance, Ministry of Trade has websites on crops price on daily basis but there is not yet any evidence that the information is used by farmers at grassroots level.

Access to finance

Microfinance institutions are available and they can cover rural areas. However, they are mostly providing credits for small traders and not farmers. This is because farming is considered to be high risk and that there is no guarantee that farmers will get good harvest especially with current unstable climate and weather.

Access to insurance

Similar to access to finance, there is not yet any specific product of insurance for crops and farming products. The Government of Indonesia through Ministry of Agriculture has the plan to produce crops insurance in 2014 but because there is not yet any permit from Ministry of Finance, the program is then expected to start in 2015. The crops being insured will be food crops especially rice. An experiment on crops insurance has been implemented since 2012.

The pilot shows that the insurer recorded loss more than four times than the premium received. And that the local government role is important to speed up the claim process. Despite the unsuccessful stories of the pilot, the Government has the commitment to replicate the project covering wider areas of farming land in 3 provinces: West Java, East Java and South Sumatra.

1.1.2. More specific challenges

Rice

- Rice is the main staple in Indonesia. Currently Indonesia is still depending on imported rice to meet the needs. Government of Indonesia has the target to be rice self-sufficient by 2015 but with the limited land for rice farming, it will be difficult to achieve unless there is technology and information to assist small holder farmers in increasing the rice productivity (such as irrigation). Policy for government may be needed to make sure that the land for rice farming will not be converted into other use, especially in Java where rice can grow better. Subsidy for rice seeds and fertilisers needs to be evaluated. There are cases where subsidised fertilisers are kept by the distributors and farmers have difficulty to access it.
- Organic rice farming is becoming a trend. In the market, mostly modern and supermarket, there have been organic brands but with no certainty whether it is really organic and customers do not know how to be sure.
- Despite all of this, there is still the need to support farmers to access information related to market, finance and insurance to support them improving their productivity. BULOG is needed to support farmers in marketing issue.

Subsistence to Sustainable Farmers (Community plantation on crops such as coffee, tropical fruits, cashew)

- Indonesia is rich with tropical crops such as coffee, tea, cacao, exotic fruits, candle nut, spices, cashews and coconut sugar. The challenges in this community plantation range from land dispute, aging tree/plantation up to the low capacity and skills of farmers. Further, such plantation with limited amount of trees, scattered in different geographical location and not being cultivated in a good way, cannot be the main source of income for farmers because the cash crops can only be harvested once a year. This situation has force them to also do other crops farming resulting in them to have limited time to take care of their cash crops. Further, the small size of land for multi-crops has made it difficult for farmers to obtain crops certification.
- Government support to facilitate farmers to organise themselves and do better farming system where farmers can have skills in doing better and effective multi-crops agriculture is required. Technology and information to assist farmer families to make them easier to make decision what crops are better for their land and how they can get access to information, market and finance will enable them to be more sustainable famers and not just subsistence farmers. Government policy in land tenure and land use can support farmers in their cultivation. Infrastructure to enable private sectors to connect to farmers (cooperative) will support the market environment.

Aging Farmers

- Less and less number of farmers in Indonesia. Young generation in Indonesia do not see farming as a good way to make a living. Further, farming is considered to be low prestige, dirty and living in poverty. There is the need to promote ‘modern farming’ where people can do farming using technology and ‘sophisticated yet user

and environment friendly' application. Young people needs to be introduced with agri-preneurship where they can learn how to do agriculture using agribusiness (land farming as well as aqua farming) and smart climate approach supported by modern technology and mobile application. Examples from successful farming by young people need to be exposed. Media promoting smart-agri-preneurship needs to be increased. Specific activities for schools and curriculum in the higher education may need to be developed to promote smart-agri-preneurship.

Aquaculture

- Indonesia is an archipelago country surrounded by water (sea and river). Yet, aquaculture is not an issue where people can easily talk about. Aquaculture is still dominated by big players and big companies where fisher-folks are considered to be working for them. Small fisherman (families) cannot compete with them in terms of the size of boat, technology and capital.
- Government assistance for fisher folks are limited and usually in the form of providing boat which in some cases are not useful as the boat is not suitable for their situation.
- Support in the form of introducing smart aquaculture business using modern affordable an user-friendly technology may need to be developed. Partnership between fisher folks and private sectors to create better and fair business environment should be explored and supported. Aquaculture practices using more environment friendly approach can be developed to help private sectors who have been working with fisher folks to increase aquaculture productivity.

Water for Agriculture

- Agriculture requires lots of water. There is not yet any clear information how farmers in Indonesia has been using water for their farming (land, aqua as well as animal farming). In Indonesia, we are used to see land farmers pumping water from ground to water their crops. And for animal farmers (such as dairy), we used to see farmers use lots of water to clean the cow's pen. There is the need to explore and find methods to make effective use of water.

1.2 GOVERNMENTAL EFFORTS AND POLICY ON FOOD SECURITY

Food security has been a significant government concern starting from the world price shocks of 2008. Presidential Decree No. 5 Year 2011 calls for increased surplus rice production of 10 million tons (about 15%) by 2015 to address food security through a policy of rice self-sufficiency. In 2011, Indonesia produced 65 million tons of rice of which, 95% came from irrigated lands. Overall, production has been growing slowly (about 1% annually) over the last ten years mainly from increases in irrigated area and cropping intensity.

There is a law on Food[1] which was released in October 2012. In 2013, a Law on Farmer Protection and Empowerment was introduced. The Law is seen as not yet providing farmers the access to land to do farming. There is no certainty that the land used by farmers will not be converted into other use.

The decentralisation in Indonesia however, has made it difficult for central government to make district government to implement the program they set at national level. On the other hand, the district government, without the order from district head (district government decision letter) will not be able to develop program in line with the program set by the national government. At provincial level and district level, the government agency relevant to G4AW will be Badan Ketahanan Pangan or Food Security Agency.

[1] http://usdaindonesia.org/wp-content/uploads/2012/11/FOOD-LAW-NO-18-2012_ENG_PRESIDENT-SIGNED.pdf

A few specific aims of the Indonesian government are:

Water

a) Production:
    i. Increased rice production to achieve food security;
    ii. Diversified and higher value cropping to improve rural livelihoods;
    iii. More productive irrigation infrastructure and its sustainable management.
b) Area under irrigation should be increased, especially on the islands outside Java; there is an ambitious target.
c) Land under irrigation on Java (and elsewhere) should not be taken up for other activities.
d) There is still some gain to be made in providing appropriate inputs and on-farm practices.
e) In many cases, water is not a very critical (day-today) factor; there is more concern about organizing the processing, the post-harvest, the (accessibility to) market, the pricing; another constraint, especially in rice, is the size of the landholdings.

Irrigation and institutions and regions

a) Assuming that for water and food, irrigation is considered as an important factor;
b) Basically all irrigation delivery is organized at the source by Ministry of Public Works; private operators have little role; decentralization of management towards provincial level in the form of Water Managament “Balais” (organisations), which also may operate where river basins cross provincial borders; through irrigation management committees at say district (Kabupaten) level, water is finally delivered to a level where P3A (water user organizations, mainly consisting of farmers) take over (depending upon situation there may in levels in P3A); up to that level it all is say a government affair for management of infrastructure and operational distribution aspects; budgets for maintenance are placed at national and at Kabupaten level, often again fed by national level;
c) At field-level, the agricultural extension services take over to optimize use of water and inputs for plant growth; the P3A is still a representative organization for these agricultural extension services under the ministry of Agriculture and as such combines water and food production; the P3As are potentially a client for the G4AW type of products; also Kabupaten governments could be; it should be noted that the P3A are in fact still formed on a pilot basis in donor driven loans (e.g. ADB, WB) to stimulate decentralization and improvement of services; there where there are no formal “P3As”, there are probably informal organizations doing the same kind of thing but no formal role in maintenance;
d) Potential for irrigation and high production of food crops is most evident on Java/Bali and Sulawesi; soil and irrigation potential is comparative high and the exact added value of optimizing the inputs of water and agricultural inputs, prevent diseases etc is comparative probably comparatively small as compared to added value of improving other aspects of the value chain; the question arises how much one wants to invest in “monitoring systems”;
e) Irrigation, water availability and production in eastern parts of Indonesia (including east java with groundwater irrigation) and the more marginal soils in Kalimantan has less natural potential, which means that optimization of inputs has comparative more value; however the scale of operations is relatively small. An exception may be the peat soils in Kalimantan and Riau/Jambi on Sumatra; there are also larger estates sometimes in food crops (pineapple en fruits, citrus); water management and agricultural inputs in peat areas is difficult and sensitive and monitoring of say soil moisture and status of crops may be useful; but peat is from water point of view the most difficult soil to monitor and again: in these areas cloud-cover is an issue; so how successful products can be, I do not know

2 ASSESSMENT OF STATUS AND PROBLEMS OF INFORMATION SUPPLY IN THE AGRICULTURAL SECTOR

For food (and water) security programs, actual and accurate (spatial) information is crucial for land and crop production systems to provide quick indicators on the context (e.g. water availability), status (e.g. biomass, crop type, acreage, etc.) and trends (within and in between seasons, years) of local farming practices/performance. In this section, the main challenges in information supply in Indonesia are summarized as well as the institutional capacity to support viable information services.

2.1 MAIN CHALLENGES IN INFORMATION SUPPLY ENCOUNTERED IN AGRICULTURAL ACTIVITIES

However, yields have been generally stagnant for the last 20 years, and productivity gains are slowing and inadequate to meet growing demand and government objectives. Deteriorating infrastructure further compromises productivity mainly due to inadequate O&M and its financing. Since 2005, the area of irrigated land with infrastructure in good condition has declined from 78% to less than 50% today. Additional challenges constrain productivity and include

(i) Weak and fragmented management among district, provincial and national governments with limited farmer participation;
(ii) Underdeveloped planning and management capacity;
(iii) Ineffective agricultural services and commercialization of agriculture;
(iv) Weak water management (irrigation uses 80% of developed water supply.

2.2 INSTITUTIONAL CAPACITY TO SUPPORT VIABLE INFORMATION SERVICES

National, regional and district-level organizations probably have the capacity to guide information services if they really want to. Large scale producers are probably organized well enough and have the capacity to receive and act on information services

Indonesia's Bill on Geospatial Information ("Law") was passed by the House of Representatives (Dewan Perwakilan Rakyat / DPR) on 5 April 2011, a little over a year after being submitted to the DPR (16/2/2010), this law states the following:

- **Geospatial information provider**
  Anyone providing geospatial information in Indonesia is required to possess competency in providing geospatial information in accordance with the prevailing laws and regulations. The administrative requirements are a deed of establishment and a business license. The technical requirements are that the provider must be a certified professional in the field of geospatial information.

- **Authoritative geospatial information**
  The Act sets a standard for acquiring geospatial information, which includes complying with the standards of the geospatial reference system, types, criteria, and data formats that will in the future be determined by the Head of the to be established Geospatial Information Agency.

- **Restrictions on data collection**
  The Act sets out the permission that must be obtained for collecting data.

- **Prohibited areas**
  If the act of collection of the data can have a hazardous effect on the collector If collected by foreign owned vehicles (airplane and vessels, but not satellites)

- **Access to geospatial information**
  "Basic Geospatial Information" is categorized as open information. But the Act also stipulates that a fee can be charged to the user.

- **Regulation**
  Oversight of the providers and users of geospatial information will be under the authority of the Geospatial Information Agency. During a transition period of 3 years, supervision will be the responsibility of Bakosurtanal.

- **Sanctions for inaccurate data**
  The Act provides administrative and criminal sanctions for geospatial data providers. If inaccuracies in supplied geospatial information result in damages to users, the provider will be subject to imprisonment of up to 3 years, or a fine of up to IDR 750 million (about $75 000). The Act also stipulates that providers are prohibited from producing products and services that do not comply with the standards that are required by the prevailing laws and regulations such as consumer protection regulations. Some commentators have suggested that this could mean data provider liability in the case of an in-car navigation system leading to an accident or failing to find an emergency facility because of inaccurate geospatial information.

2.2.1 General information suppliers active in Agriculture domain

In Indonesia, Agriculture and Water are treated separately. Agriculture is the responsibility of Ministry of Agriculture and Plantation whereas water is the responsibility of the Ministry of Public Works.

The Ministry of Public Works under Directorate General of Water Resources has also its own information system where they are providing information on water facilities both for rural and urban communities[2]. In this link, various data is available related to water, watershed, and government strategic project related to water, and e-magazine on water. However, there is not yet any specific information on how geospatial can be used in agriculture and whether such information can be accessible to farmers especially in rural areas.

Under the Food Security Agency or Badan Ketahanan Pangan[3]. They have information on the national program related to food security. And under the Food Diversification and Safety Agency[4]. They have a program to promote food diversification including local crops. The aim is to obtain food security and food sovereignty so that Indonesia will not be too dependent on imported foods.

The Ministry of Marine Affairs and Fisheries[5] has a program called Blue Economics[6] aiming to promote marine-based economic development in Indonesia. The program is also supported by FAO.

[2] http://sda.pu.go.id
[3] http://bkp.deptan.go.id/
[4] http://pusat-pkkp.bkp.deptan.go.id/home

[5] http://www.kkp.go.id/
[6] http://blueeconomyindonesia.com/

The Ministry of Telecommunication and Informatics has a program where they are setting up mobile internet at the sub-district level. But, it is not directly related to geodata and agriculture. There is the need to explore the possibility for The Ministry of Telecommunication and Informatics to make coordination with BMKG and Ministry of Agriculture to develop information relevant to agriculture to help farmers improving their productivities.

2.2.2 Specific Agri-sector information supply and current mechanisms

- Inventory of specific Agri-sector information supply and current mechanisms

Satellite images (and aerial photography) play an important role in all kind of mapping and planning in Indonesia for agriculture and water. The Ministry of Agriculture has several units working on agriculture and related issues. Under Directorate General Agriculture Infrastructure has also information related to agriculture map using geodata[7].

They are able to provide training course on GPS and GIS for agriculture. But the same question is whether the information is known and used by farmers especially in rural areas. And how to make sure that such useful information can contribute to the improvement of farmer's livelihoods

The Meteorology, Climatology and Geophysics Agency (BMKG) is responsible to provide update information related to climate, weather, geodata and related issues. They have the capacity to provide geodata and information that can be useful for agriculture. Currently, they have been active in developing collaboration with other parties such as Bogor Agricultural University (IPB) in organising climate-based agriculture course.

2.2.3 Other sectors (and role of information) important for the Agricultural sector

The Ministry of Public Works under Directorate General of Water Resources has also its own information system.

The Ministry of Marine Affairs and Fisheries[8] has a program called Blue Economics[9] aiming to promote marine-based economic development in Indonesia. The program is also supported by FAO.

The Ministry of Telecommunication and Informatics has a program where they are setting up mobile internet at the sub-district level.

[7] http://psp.deptan.go.id/
[8] http://www.kkp.go.id/
[9] http://blueeconomyindonesia.com/

3 NEEDS ASSESSMENT OF IMPROVED ICT & INFORMATION SUPPLY IN THE AGRI SECTOR

In this section, an inventory of specific needs and problems in the information supply (and demand) in the Indonesian Agri sector is provided. The most important local stakeholders represented in the identified problem domains are selected (short list). Furthermore, additional stakeholders in related domains need to be selected (e.g. water domain, nature, industry, etc.).

3.1 NEEDS ASSESSMENT WITH A FOCUS ON POTENTIAL USE OF SPATIALLY BASED INFORMATION SERVICES

There are various potential for sustainable spatially based information services, such as:

- **Landscape-based value change**. Having a spatial map in a landscape or one geographical area, it will be easier to identify the area for farming and/or plantation, to identify the border of the customary land or forest, to identify water resources, etc. Having a clear map, it is easier to identify what sustainable value chain or supply chain that can be developed.
- **Preventing land conflict and dispute due to unclear borders**.
- Disaster risk preparedness ad mitigation. Having a good spatial map, we can also identify the potential natural disasters existing in the specific area such as eruption, flooding, earthquake. And based on the data/information, we can develop better strategy to reduce and mitigate the risk. Further, the community including farmers can develop strategy for adaptation of the changing spatial condition including strategy for evacuation and security.
- Spatial based information services can help farmers to **get updated information on the forecast weather and climate change** so they can decide crops that are more suitable with the weather and climate. Further, using the same information, bank and insurance companies can use them in calculating risks for crops damaged due to disasters and/or climate change.
- **Landless and small holder farmers located in different geographical location**
  G4AW: Law on Land Profit sharing Agreement could be monitored using (radar & optical) remote sensing as indicator (be aware 100% legal prove classification of land is NOT feasible) that landuse , eg. Like the control of the 50:50 rice land sharing

  G4AW: With the actual mapping of the location of rice using (radar) RS also local production and with that the effect on local market prices can be anticipated by within season rice (production) statistics from satellites during the growing season

- **Unavailability of extension workers**
  G4AW: a potential side spinoff of agricultural monitoring and acreage mapping of various crops by using satelite RS is that the extension service (Dept of Agriculture) can use the recent (within season) crop statistics indicators as a base for optimization of logistics to send more extension workers to areas with expected higher yields and acreage of crops

- **Road Conditions/infrastructure/farming facilities**
  G4AW: a potential side spin off of agriculture statistics retrieved from RS is that (certainly over the years average) indications of structural high or low yield regions of crops give indication where policy should invest in improving infrastructure onto the right places to benefit more from this in the future. RS helps in policy support and priority decision making.

- **Access to market information**
  G4AW: See earlier on timely RS information on crop production and mapping indicators could help in analysis of market information (location, pricing, volumes of various crops)

- **Access to finance**
  G4AW: The insurance model can benefit from risk indicators derived from RS: Crop Statistics produced can lead to structural (over the years) problem areas indication, which help in premium differentiation strategies or investment priorities to improve the situation in certain areas. E.g. due to structural water shortage or flooding or distribution of water in general in certain areas one could adapt insurance strategies and investment strategies on the long term to improve the situation

- **Access to insurance**
  G4AW: see above

3.2 PUBLIC AND PRIVATE PROBLEM STAKEHOLDERS AND INTERNATIONAL ORGANIZATIONS IN THE DOMAIN OF G4AW

- *Identify relevant **Problem stakeholders** (public, private) in partner* Indonesia *and international organizations in the domain of G4AW. for instance:*
  - Ministries, agencies,
  - Knowledge institutions (CGIAR, universities),
  - Local enterprises (IT services, telecom providers service providers, banks (micro insurance = MFI's)
  - Local NGO's and other relevant institutions such as local FAO, World Bank, IFAD offices.

See above sections the various public and private organisations mentioned. See also stakeholders list input to Mission NSO in week 19.

3.3 ONGOING G4AW RELEVANT ACTIVITIES AND/OR PROJECTS IN INDONESIA

Currently there is no clear and updated information on G4AW relevant project in Indonesia. Relevant projects could be:

- Sekolah Lapang Iklim or Climate Field School organised by BMKG. Beginning in 2011, they have set up climate field school in 25 different areas in Indonesia[10];
- In Central Java, Bintari Foundation has implemented similar project but focusing on coastal issues[11];
- FAO and National Nuclear Energy Agency (BATAN Indonesia) have developed cooperation in the use of nuclear technology to improve food security and food safety starting in December 2013[12];
- A coalition of NGOs in Indonesia JKPP are providing geomaps[13].
- BAKOSURTANAL, the national mapping agency, with its own satellite stations etc; extensive knowledge;
- BPPT (say Indonesian TNO); Badan Penelitian dan Pembangunan Teknologi, Agency for research and development of Technology;

[10] http://www.antaranews.com/berita/404482/bmkg-bikin-25-sekolah-lapang-iklim
[11] http://www.bintari.org/index.php/en/our-works/climate-change/95-tot-sekolah-lapang-iklim-untuk-masyarakat-pesisir-semarang
[12] http://www.fao.org/about/who-we-are/director-gen/faodg-news-archive/detail/en/c/209345/
[13] http://www.jkpp.org/content.asp?pmid=57&mid=204

- IPB, Agricultural Institute in Bogor;
- Peat Research Centre;
- LIPI (Indonesian Institute of Sciences);
- KNMI Indonesia (forgot the name);
- Public Works (national, regional, Kabupaten) and the River basin Authorities for water management

3.4 REFERENCES TO PUBLIC DOMAIN PUBLICATIONS

- Rudolf W. MATINDAS, PUNTODEWO, Bebas PURNAWAN, Indonesia - Development of National Spatial Data Infrastructure in Indonesia: http://www.fig.net/pub/athens/papers/ts02/ts02_1_matindas_et_al.pdf
- Remote Sensing Applications for Supporting Agriculture and Food Security in Indonesia (PowerPoint presentation): http://www.aprsaf.org/annual_meetings/aprsaf20/pdf/working_groups/eo_day2/05_0945_LAPAN_Agriculture-FoodSecurity_APRSAF20_2Dec2013_r1pptx.pdf
- The Applications of Satellite Remote Sensing on Climate Change and Food Security in Indonesia (PowerPoint presentation): http://www.oosa.unvienna.org/pdf/pres/copuos2010/tech-18E.pdf

4 INVENTORY OF POTENTIAL (CHAIN) SOLUTIONS DIRECTIONS USING GEO-ICT IN LOCAL AGRICULTURE ISSUES

4.1 BASE SOLUTION DIRECTIONS IN INDONESIA TAILORED TO LOCAL AGRICULTURAL PRACTICES

Aging Farmers and attracting (interest) of young people

The education and awareness of RS applications and the combination with modern technology like communication (app development, telecom and mobile solution, location based services) and ICT in general (like googlemaps, facebook, open data, etc) should be stimulated.

In an educational component by involving entities (in the G4AW partnerships) active in eduction and research and development can be introduced. It requires a long term vision and should be especially stimulated by the government and the involved ministeries**.**

Landless and small holder farmers located in different geographical location

Law on Land Profit sharing Agreement could be monitored using (radar & optical) remote sensing as indicator (be aware 100% legal prove classification of land is NOT feasible) that landuse , eg. Like the control of the 50:50 rice land sharing

With the actual mapping of the location of rice using (radar) RS also local production and with that the effect on local market prices can be anticipated by within season rice (production) statistics from satellites during the growing season

Unavailability of extension workers

A potential side spinoff of agricultural monitoring and acreage mapping of various crops by using satelite RS is that the extension service (Dept of Agriculture) can use the recent (within season) crop statistics indicators as a base for optimization of logistics to send more extension workers to areas with expected higher yields and acreage of crops

Road Conditions/infrastructure/farming facilities

A potential side spin off of agriculture statistics retrieved from RS is that (certainly over the years average) indications of structural high or low yield regions of crops give indication where policy should invest in improving infrastructure onto the right places to benefit more from this in the future. RS helps in policy support and priority decision making.

4.1.1 ACTUAL AGRI-SPATIAL INFORMATION SERVICES

Using remote sensing as a support for actual (within season) information supply combined with field knowledge and information from the regular sources(extension services, etc.) specific suggestions can be considered as below:

Radar system which can penetrate clouds

It might have potential to use radar system which can penetrate clouds. Part of the year in the drier seasons, chances of good images may be better, but crops would often be in the ripening stage and inputs of water and fertilizers etc. less crucial then in the rainy season, when there are more clouds. It however has to be confirmed whether the radar images can provide the sufficiently meaningful information and interpretation for food production factors; for example about acidity or salt intrusion.

Prediction of rainfall
Satellite images can sufficiently predict rainfall and rainfall intensity. It has however to be further researched to know which lead-time is needed. It could then be used either:

a. To predict high rainfall, which may lead to floods, which may cause damage, for which farmers can prepare themselves. This information can also be useful for operators of dams and other infrastructure related to water and food security (for example flooding of agricultural areas.
b. To predict rainfall, so that irrigation schedules can be adapted (linking it to previous rainfall etc.); this could help to optimize reservoir management and conserve precious resources; the government could be a potential client of G4AW
c. To predict rainfall, so that something can be said about the extent of drier periods, or the end of drier periods, so as to make informed decisions on providing water; this may be especially relevant for the eastern parts of Indonesia.

4.1.2 Farm insurance and risk prevention strategies

Access to market information
See earlier on timely RS information on crop production and mapping indicators could help in analysis of market information (location, pricing, volumes of various crops)

Access to finance and insurance
G4AW: The insurance model can benefit from risk indicators derived from RS: Crop Statistics produced can lead to structural (over the years) problem areas indication, which help in premium differentiation strategies or investment priorities to improve the situation in certain areas. E.g. due to structural water shortage or flooding or distribution of water in general in certain areas one could adapt insurance strategies and investment strategies on the long term to improve the situation.

4.2 Differentiation of spatial solutions tailored to Agricultural practices/sector in Indonesia

Rice production increase for improved self sufficiency
The potential crops statistics derived from (radar and optical) RS have been technically proven in the past in several projects (SARI project, and others). The operational applicability is depending on the acceptation of introducing this new information besides/on top/integrated with the traditional Indonesian census system.

Irrigation and water availability is difficult to map in Indonesia using RS derived evapotranspiration products/services (due to cloud and thermal/optical RS), however radar can map the flooded rice area during the growing season and possibly indicate in temporal analysis the absence of water (leading to lack of inundation). This could lead to decisions to improve/change the water distribution to local areas.

RS derived crops statistics together with the census statistics could be input to land evaluation processes. Which areas are traditional low and high yielding areas for the rice crop. In case of low yielding areas probably replacement of rice with other crops could be realised.

Subsistence to Sustainable Farmers (Community plantation on crops such as coffee, tropical fruits, cashew)

RS derived crops statistics together with the census statistics could be input to land evaluation processes. Which areas are traditional low and high yielding areas for the various cash crops. In case of low yielding areas probably replacement with other (less vulnerable crops could be realised. This requires also collaboration with agricultural research institutes advising and testing on crops resilience to drought, diseases, poor soil conditions, etc.

A specific example can be given on Oil Palm in South Kalimantan (peat areas), where RS could monitor the growth performance and map the location. Also the good and poor performance lead to indications of quality in soils and with that the suitability of growing other crops. It could lead to optimization of land use when the right governance procedures are in place.

Aquaculture

The use of RS especially on water quality (optical RS) could help in monitoring waters with algae or water plants (e.g. water hyacinth or other plants). The monitoring could help in assessing problems on fishing cultures (preventing monocultures like the Nile Baars in Lake Victoria in Africa) or fish production problems due to shortage of oxygen or acidity due to organic waste for example.