INTEGRATED LAND MANAGEMENT – ICT SOLUTIONS & BUSINESS MODELS

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ABSTRACT

According a study (E.Gelb, 2010), on the question "Do you think there are problems with uptake of ICT in agriculture?", 53%(2001), 79%(03), 97%(05, 94%(07) of experts answered "yes". What happened? Why that?

It is a mixture of complexity (Mercedes with 1000 suppliers is easy to manage compared with 2,5 bio farmers worldwide, from 1 to 100.000+ha), technological tasks (farmers integrated into horizontal and vertical chains), organizational tasks (diverse structures with many targets (agriculture, forestry, environment, risk, private and public, commons …..) and the behaving of structures that sometimes do not want to change or even move!
PROGIS worked out solutions that fit to the existing needs.

Keywords: GIS, integrated farm management, rural logistics, precision
                farming, food/feed traceability, horizontal and vertical integration

INTRODUCTION

The technologies PROGIS developed and installed many 1000 times worldwide since 95 are:
- **WinGIS**, an object oriented hybrid GIS
- **AGROffice**, a suite of applications that fit to agriculture with **DokuPlant** (planning, documentation and activity mgmt.; energy-, CO^2-balance, nutrient balance;   cost- or profit margin, inventory; localized subsidy management (with local partners); business plan as well as insurance data and thematic maps, …..;
- **FORESTOffice**: for forest-inventory and all forest management needs
- **EnvironOffice** with Fomumiis (together with Prof. Pitterle, A) for environment- or risk management
- **LOGISTICS**: with central and mobil GIS incl. communication between
- **Precision and virtual farming/forestry**
- **Land consolidation** (together with the Lower Austrian Government)
- Further the integration of **Microsoft´s BING** data or **Google Earth´s** data worldwide or any other data and

- further integrator for **partners** like meteorology sensors (Adcon, Pessl), GNSS (EC dGPS data), mobile hardware (iLOGS), RFID, GPRS/UMTS communication, GPS integration etc. and
- further PROGIS has **sector consulting know how for agriculture, forestry, land management, environmental management and risk management** incl. the technologies that are needed as well as the visions how we have to management our nature in the future to solve or avoid problems as we have them today and cooperates with consultants worldwide.

User interface and expert info

The user interface contains 4 elements:
- 1. Geography and
- 2. database (= GIS), but further also the
- 3. time- and activity management without it is not possible to manage anything and you just get historical maps as a result. As
- 4. element we embedded an expert information system that has to be setup and sustainable managed with deep cooperation of local experts. The system can be split in an agro, forest, environment or risk system and e.g. contains within the agro model (numbers in bracket are the German numbers and authors) all machines with their costs (2500 machines, KTBL) and achievements, all organic and inorganic fertilizer (2500, KBM) with their chemical content, all pesticides (850, KBM) with chemical active substances, all crops and varieties (20.000, different sources) available in a country and all the activities for every crop (500 crops are already predefined with all the activities, KBM, BMR, others) during a growth period.
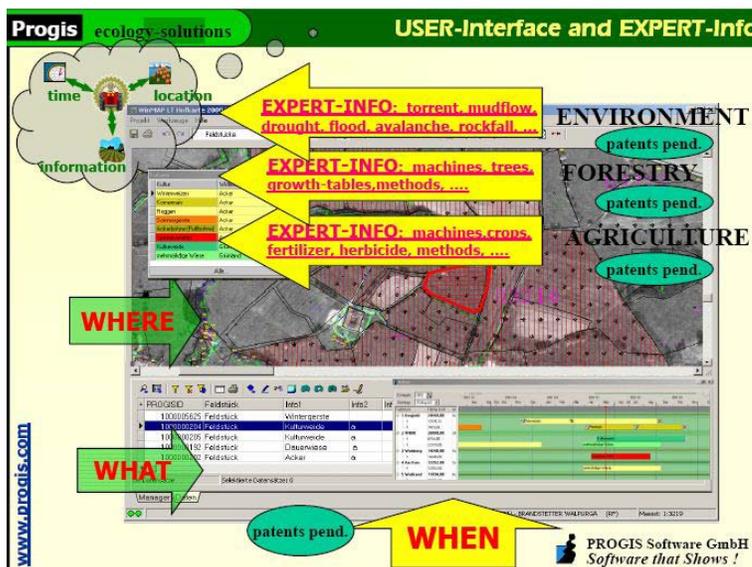

Fig. 1: user interface and expert info

With the help of additional PROGIS software, the general user also can modify the expert model if he does not agree with the setup of the expert data.

The forest model contains growth tables of the different trees with all the necessary data of a standard growth table as well as the data like methods, machines, activities etc.

The environmental- and risk model have to be set up by experts again and expert-users can define the models for one or several problems and which data have to become part of the system and how the calculation for the output has to be done. The output is – based on the calculation result - a thematic map that shows the importance of one or all landscape elements in relation to one or several problems and how the landscape elements might increase their benefits due to farmers work according predefined targets – environmental caretaking or risk-management can be planned by experts, implemented by farmers, controlled by 3rd parties, farmers get paid. Environmental caretaking together with farmers!

Expert models allow a simple entry as the model summarizes ALL activities for one specific crop or in general for one activity; the action is reduced to a click or one drag and drop: Here (1 polygon (= field or forest element) in the geography I grow that (click on a specific crop).

Horizontal and vertical applications

We have to understand that agriculture and forestry is linked horizontally and vertically into the market and an agro-chain management e.g. is much more complex than if Mercedes tells 1000 suppliers that they have to use one standard that they defined. In agriculture we have 2.5 billion suppliers, nearly 200 countries, different market chains with direct farmer to customer markets and food giants like Nestle or Unilever and any amount of diverse products for which also traceability, optimize of transport, quality etc. has to be maintained and if managed wrong a problem will be with the health of the people that eat this food.

The **horizontal integration** simulates with ICT technology the cooperation of farmers to work together in e.g. harvesting etc.; naturally also forest enterprise can cooperate to sell or harvest their wood together. It means that the summary of the information where single farmers grow e.g. sugar-beets or anything else is the input for a logistics system. A cooperative for example is managing the logistics for thousands of farmers (when has to be done what and sending a machine to a specific field with a specific contract and with the help of a stationary (Coop-office) and mobile (on the machine) GIS system (com with GPRS / UMTS). Beside logistics with the same principle we can link following technologies to a (logistic) communication network in a country: Precision and virtual farming, land consolidation, carbon calculation, environmental- and risk management and mapping.

The **vertical integration** mans the integration of farmers or foresters or even environmental caretakers in a chain management system. The farmers has the complexity that with information from his fields he has to support many large organizations: Ministry for subsidies, certification bodies with field information, food buyers also with field information – possibly other information, environmental bodies again with other information etc.; from the point of ICT, it is adverse to enter information more than once – what partly is done in European

countries – the farmer is burdened to enter the same data often, more: a clever IT system has to be developed that information is entered only once and then distributed automatically (Internet is a 2-way communication although it is used be powerful organizations in many cases as a top down system only!!!). A way out for the future will be a Trust Centre (details available on request, please mail to mayer@progis.com , that stores farmers data and gives access to data based on precise rules and access authorization.

Trust centre will become the Agro Data Center for rural area management in the future!
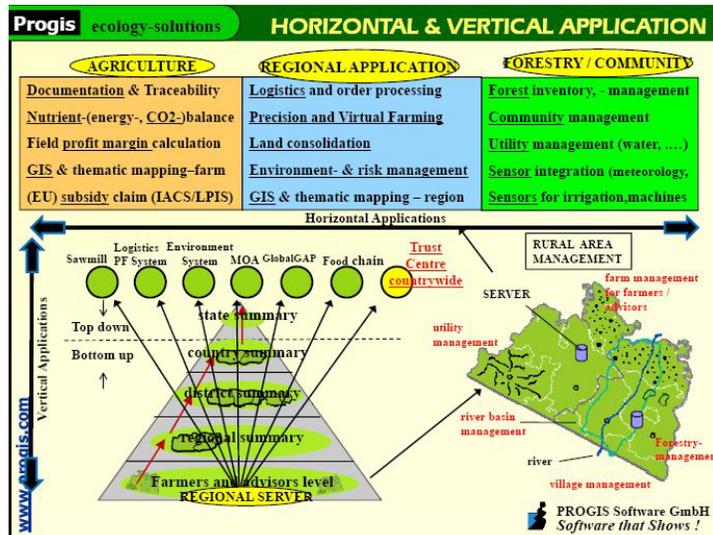
Fig.2: Horizontal/vertical apps

Integrate banks and/or insurance companies

We have also to recognize that, when we work with DokuPlant and make instead a plan for 1 year a plan for 3/5 years, we have with entering a few additional data for a farmer a business plan ready as well as we can send the data automatically (or retrieveable via a trust centre) to an insurance company for getting an insurance policy. Both, banks and insurance will benefit from the possibility to get these data and will support the setup of such systems.

A process will be triggered that starts with information: Without it no insurance will be able to insure, without insurance financing will not be possible, without financing the farming process will not start. A.m. sentence is valid for micro-financing. It starts with information!!

Naturally with the information in background, banks and insurance companies will also be able to become part of the setup of new advisory services. We have just to take into consideration that advise should be an objective advise and not a sales process only.

Integrate energy- or CO²-balance

We have also to understand that when we know all the activities for a specific field that has to be done (first planning and then the control of the "done" itself), we understand the energy as well as a CO_2 impact. As DokuPlant has all these data embedded we can easily calculate energy or CO_2 impacts of a field or also of a farm. When we have set up an advisory service within a country, we know the energy or CO_2 impact in a complete country. A development country can build up a system that will allow to get carbon financing from the industry states for the development of their agriculture or forestry within a complete state. We also have to understand that energy and the linked CO_2 reduction in many cases is equal to cost reduction, so we optimize the complete process with such a model!

Integrated rural area management

An integrated rural area management means, that with an advisory service model according PROGIS philosophy, customers are able to build up an advisory system covering a complete country; the experts are equipped with intelligent software like mentioned and support within short time farmers with all the necessary output. We do not see every farmer running his own PC; it makes no sense to work with a PC when you only use it a few times a year and also when you come home late evening you will not type in or calculate anything. The advisor comes once to the farmer for planning (setup of field polygons first time will need some time, in Europe they are available (LPIS data) and just can be imported) what will need 1 or 2 hours and then the farmers puts the done activities in a calendar and the experts types it in within 2-3 hours at the end of the year when he plans the next year together with the farmer. Large farms can run their own system and enlarge this for their own needs with e.g. precision farming applications etc.

For the benefit of an advisory system we have in Europe an excellent example: Denmark has 56 advisors per 1000 farmers, the rest of Europe between 1 and 6; why that? Are the Danish stupid? No!! They understood that one advisor that is working on e.g. 3000-4000 ha can be profitable for the farmers he supports. And Denmark has economically AND ecologically one of the best if not THE best agriculture of the world! (The Danish visited us already ;-)!!).

When groups of advisors just export their data into a larger regional server, this server contains now all the data necessary for regional solutions as there are logistics, precision farming, etc. etc.; suddenly such a concept becomes extremely powerful and the farmer on the other hand get prepared to work better with higher profits but also are working better for the environmental questions and – that is of highest importance for the future – will be able to work out complete new products like environmental caretaking or risk management for complete regions because after the expert driven definition of targets the work of a single farmers can be defined, verified and controlled and at the end paid. Environmental caretaking and risk-management work will become an additional income for farmers.

Education and capacity building for advisory networks will become of high importance; the advisor must be practical oriented or a generalist and NOT a specialist for a single crop only.

Integrate agro (-forest) logistics

Logistic means that one dispatcher (e.g. installed in a machine cooperative office or in any other agricultural office available (e.g. chambers, advisory services, ministry services etc.) is able to understand the whole logistic needs of a region (in Germany one such a region covers approx. 1000 farmers) and is able to understand all details when and which machine is needed where. Contracts can be sent with GPRS/UMTS (=telephone) to the office however or can be automatically transferred with one click from DokuPlant (new module "contract transfer" is already installed). The contract when arrived in the office can be forwarded automatically to a mobile GIS system installed on a PC (ruggedized laptop or field-book) at an agricultural machine. The driver approves the contract and starts driving towards his target guided by his mobile GIS. When the job is done the driver is pressing one button and the dispatch office knows that he finalized a specific job.

In specific cases, e.g. at the sugar-beet harvesting, the dispatcher can start based on the know how where are how many tons of sugar-beets, immediately a second process, that means he is sending a contract to a pickup machine to pick up at known locations x tons of sugar-beets. The pick-up driver invites - based on the know-how of the locations and the amount of sugar-beets and the know how of the local situation a specific amount of trucks with an embedded Tom-Tom system. At the loading of the harvested goods, mobGIS transfers the data to an RFID chip installed at the truck and the harvest results goes together with the data to a factory where the truck and the RFID are unloaded and e.g. sent to another mobGIS at the weighing machine.
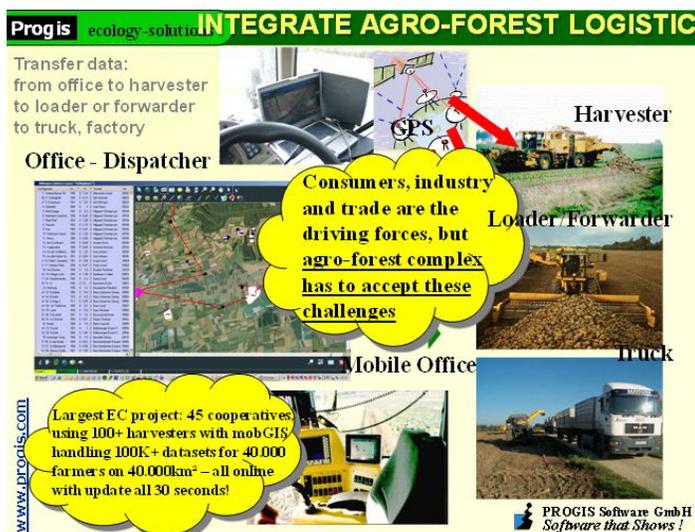
Fig 3: Logistic – fast benefit

With such a method in Southern Germany at a region of 40.000 km², 6 sugar factories (and many biogas plants) are linked with 40.000 farmers and 100.000

fields. Based on this technology and after the success of the sugar-beet installation, step by step new crops are linked to the system without problems. The ROI of such a system was in the given case less than one year and will be significant high everywhere. Further it has also implications on the process that farmers are more involved in IT solutions – thoroughly with the help of advisors – as the benefits are high and measurable and the industry helps to trigger this process.

What PROGIS actually did is to enable a partner, the German Machine Cooperatives with 190.000 members, 260 offices and 7,2 mio ha of fields managed by their members) to do ICT services for their members. Logistic was an enabler, farmers are more and more linked via DokuPlant to send their contracts direct to the servers and from there to the machines.

If logistics is managed in this high sophisticated model as mentioned above or in a light model with few or no machines at all, it is always important to know where are the farmers located with their fields, where you have to deliver seeds or fertilizer and where to collect harvested goods. The benefit is enormous and is seen by farmers immediately; is motivates to attend in the system. Logistics is reducing millions of €/$ in cost + reduces CO_2 - instant.

Precision and virtual farming

Precision and virtual farming means nothing else than to understand in detail the inhomogeneous fields with the need, when known (from crop rotation, nutrient investigation via labs, newest satellite data with chlorophyll data or soil moisture data, crop harvest result of the last year etc.) to start precise (m² precise) fertilization or turnout of pesticides. This processes can be planned with WinGIS and tools like Isoline linked to DokuPlant, the information can be transferred then later with a contract (e.g. logistic contract with map!) to a machine (in detail: to a GPRS/UMTS communication linked PC on the e.g. tractor) and the tractor can support the deploying of fertilizer according a map.

More – we can use old tractors or old fertilizer equipment with the help of a map and the GPS location. We just need a PC with communication unit and GPS embedded on the tractor. Mechanically the driver can change the e.g. kg fertilizer per m².

If the tractor is old and the fertilizer machine is new with the electronic needed already equipped – available on the market today from many suppliers, ask if necessary - the data from the PC can be send to the fertilizer equipment that works according the map.

The last possibility is, that the farmer has a new tractor with CAN bus or ISO bus; then we also can take data from the tractor like diesel use on a specific field etc.

Variable rate application means less costs, more benefits, protecting the environment and working more sustainable, and it is CO_2 reduction also!

Precision farming details I

These pictures show maps of tracks or combined with maps of where and how much was the intention to spray and was sprayed really. It gives a complete documentation what happened on the field.

One project was done, how several farmers with bad shaped fields cooperated by working together and logged the costs (ploughing, fertilization etc.) and the revenues (harvest results) and spread the precise calculated result in €or $ within each other. Every farmer knows, how many more costs arrive at a small or bad shaped field. With such a model, a cooperation is possible with precise distribution of results according precise data. Again: cost reduction = CO_2 reduction!
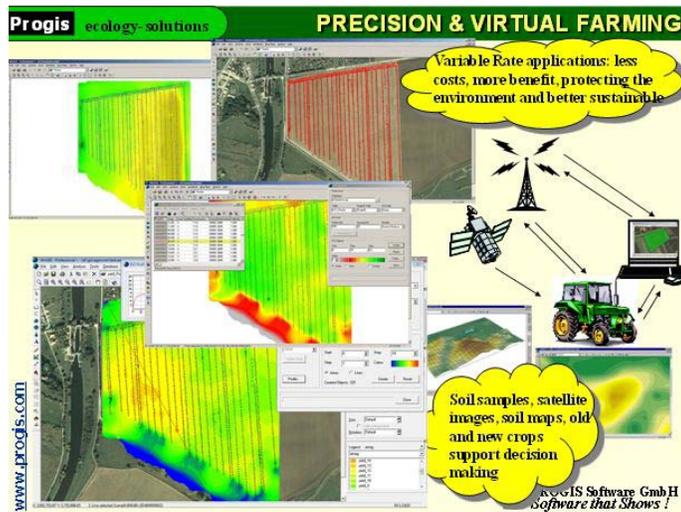
Fig. 4: All tools for precision farming

Mission and goal of WinGIS Forest

WinGIS Forestry is an application that covers, based on local growth tables developed by local forest experts (if know how is needed we can also support this) a complete forest inventory and forest management model for small farmers or even also for large forest enterprises or complete regions/countries. GIS and applications are working within a group of consultants for many years and allows also to be linked to other PROGIS applications like e.g. logistics (we see a rural area logistics but not a potato logistic, a sugar-beet logistic and one more logistic for logs!)

Output of WinGIS Forest

The output of the Forest GIS incorporates habitat data, inventory and reserve data, growth data, all necessary planning data up to ten years (or even 20 or more if wanted), all data can be grouped within areas and sub-summarized, graphic output supports a fast reading and any thematic map can be printed.
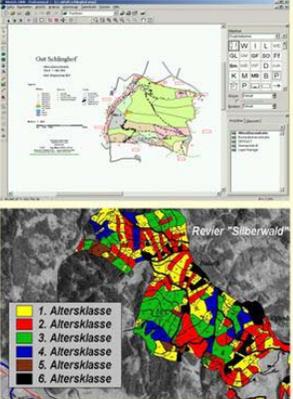
Fig. 5: Forest-inventory and –management

Forest inventory and management: The forest software can be used by smallholders as part of DokuPlant or by medium or large forest enterprises or even with the support of advisory centers throughout a country.

International request for integrative ICT

There is an international request for integrative ICT systems as proven by organizations like: Minister conference EC, FLEGT procedure, Forest conferences, UN forest forum, FAO, ILO, ECE, etc.; the main topics always mentioned are: biodiversity, sustainability, multipurpose use, economical benefits, carrying capacities, public awareness and all based on measurable, reliable and quantitative criteria.

Fig. 6: Request for integral solutions

What is valid for the forestry is also valid for the agriculture and only the management of all elements within a landscape together can really set up models that are sustainable and can be managed according the a.m. principles! We need new land management models as well as new advisory systems. Sometimes existing administrative structures are a burden to setup integrative systems.

Flood – drought – landslide

Wrong managed landscapes – agriculture, forestry errors - can be the base for incidents like flood, drought or land slide etc..

Sample Austria

Austria can be one example of a rough environment that was managed carefully during the last centuries as otherwise a surviving in such a landscape would not have been possible. What such a landscape also gives is a very fast learning process – a failure in managing the landscape gives immediately a result like a torrent problem, an avalanche or a landslide. You recognize what was the reason for the problem. Cause and effect are very close together!

It gave also the understanding that we have to prevent things before they happen; if an event starts you can nearly not stop it anymore – to stop an avalanche or a torrent or landslide is nearly impossible. But - e.g. afforestation on top of a mountain supports the minimizing of avalanches or landslides, it needs times but is much cheaper then to construct mechanical barriers. So we have to start today!

Forests in Austria

Forestry is the main land category in Austria (depending on region 20–80/50%) and is also the main natural resource for economic development and the main natural resource for protection against natural hazards.

Forest responsibilities: The forest produce beside wood, bio-energy or fruits or herbs also conservation of soil, water, air and local climate resources, and protects against floods, avalanches, landslides, rock-fall etc. and protects people´s lives, the land settlement and its infrastructure and provides land for agriculture.

Multiple forest (or agricultural) functions: The multiple forest functions are beside wood and timber also air quality, local climate, water quality and storage and supply, source of bio-energy, recreation, protection against natural hazards etc. Such a multiple function forest has to be managed sustainable to allow the long run survival of local people.

Forest inventory and certification: FOMUMIIS – Forest Multiple Use Measurable Indicator System as demanded by international forest authorities is also based on EN or ISO norms for forest products and services, environmental quality and forest quality management.

ENVIROffice – results

The results give the intensity of a forest–function and of a stand–fulfillment, for one or for several topics. This is also the base for future work to increase these functions or fulfillments with the help of farmers. Environmental caretaking and risk management with the farmers is possible and is done already within large pilot projects.

ENVIROffice – environmental caretaking and risk-management

The picture shows the principal problem: One of three foresters had a need of 5.000 € and started to cut logs, legally everything ok; the following year there was an extreme winter with 4,5 m snow – the extreme weather situations increase at the moment worldwide very fast – and an avalanche destroyed the road down under so that the Road Ministry had to invest 25 Mi € for a new road as behind a tourism region is located. Why did we not have 5K€ for the forester and guide him to optimize the protection function of his forest. We would have saved as national economy nearly 25 Mio €
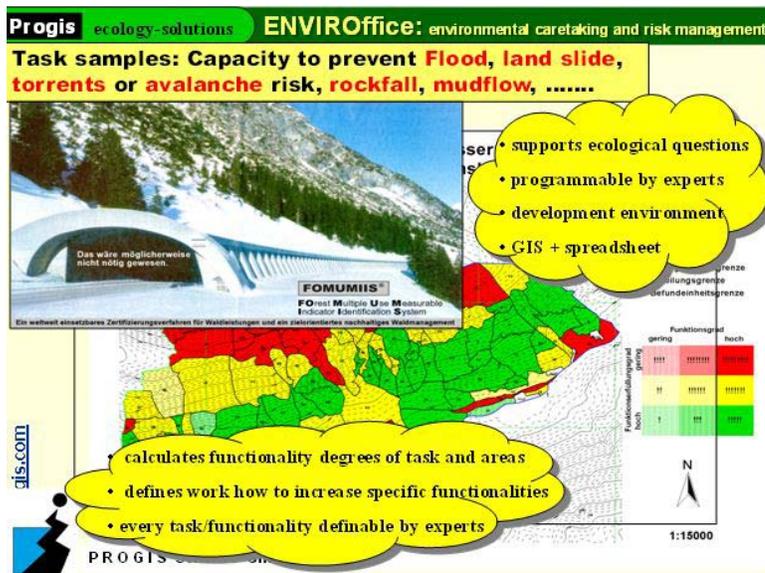
Fig. 7: ENVIROffice

I am sure that such "happenings" take place several times every day at the planet. We have to optimize it!! We do in Austria already large projects with the railway organization based on these principles where farmers are part of a risk management system, they work on their steep forests, guided by experts according a plan, with the target to minimize the chance for stones falling down on the rails and maybe cause a million € damage. A win-win situation between farmers, railway organization, insurance (got a risk assessment) and experts (did their expert job). This principle can be implemented for hundreds of problems worldwide and would give a return to farmers and the benefit to beneficiaries like a.m. the railway organization, and gives thousands of new workplaces for the benefit of all of us.

   Together with the land consolidation department of the Austrian Government we developed a land-consolidation tool for public bodies. The sales rights outside of Austria stay with PROGIS. In the following a short summary (abstract) of the functionalities:

Import of land register data: Land register data can be imported from the ground-book, …..

Import of cadastre data: cadastre data from the governmental database (an ArcInfo is used); a topology is build automatically with the PROGIS technology. Import and topology building takes a few seconds only.

Delimination of the involved area: The delimination of the involved area takes place, ….

Visualization of land holdings: and a visualization of the land holdings is done.

Surveying: Surveying is done as well and these data are imported into WinGIS,

Evaluation of soil: Further soil evaluation has been worked out and ……..

land value classes: the results are transferred also into WinGIS and displayed and calculated on land classes, calculated with an ISO module as part of WinGIS.

Intersection parcels – evaluation: Intersection of parcels is done as well as the necessary calculation.
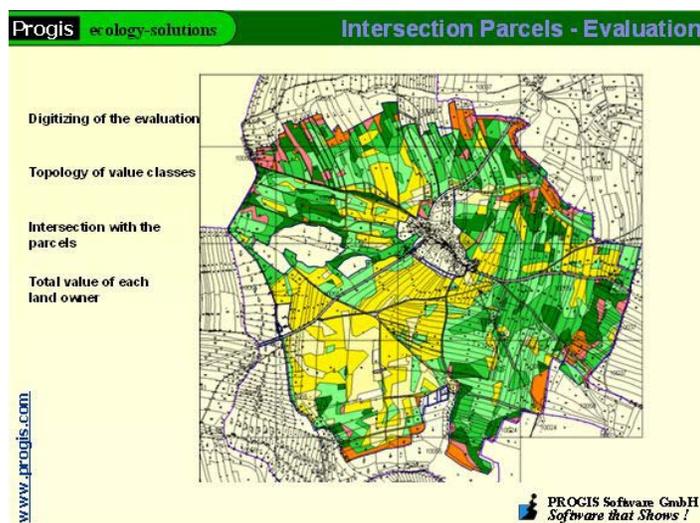
Fig. 8: Land consolidation

Planning of the area of the common interest, like public ways, water bodies, green areas or nature protection space is a next step to be undertaken.

Before and after consolidation: Finally the result can be visualized, printed, the calculation results shown etc.

Technology behind – Partners

"Basfood" from NL as well as the German/Canadian consortium "Rapid Eye" have satellites that are enabled to measure O^2, CO^2, H^2O or even chlorophyll, organic matter or others and can display the results. Together with ground references the data can be shown on a field level and used for planning / precision farming purposes. The question of the big numbers is the key for success in a country. These great technologies will work only within a large number supporting concept with e.g. advisors that are backed to support larger regions and many farmers. Then suddenly the price per ha will decrease significantly to an extreme small number. Another precondition is, that the result – a map - can be easily and automatically transmitted to machines working on a field. A PROGIS logistic concept enlarged for precision farming, it means behind the contract a map is send and can be interpreted by a machine, is THE solution for such a need – setup within structures throughout complete countries.

Further technologies that PROGIS embedded (partly we are, spoken in ICT language, an ICT "system integrator") are weather-stations and soil moisture data that enable an optimization of pesticide use or even of irrigation. The understanding of the microclimate can help to reduce necessary pesticide sprayings (14 sprays could be reduced to 4 sprays because of an embedded expert model – farmers in a specific region could also be automatically guided with an SMS information: "Please spray tomorrow morning") or soil moisture data transferred automatically to a WinGIS map will show in detail the need for irrigation – then when water is needed because the soil moisture was measured and not the starving plant was detected.

Mobile data loggers of partner companies are further tools that can be embedded into PROGIS technologies.

Together with giants like Fujitsu, Siemens and Microsoft we work on a PROGIS concept "Trust centre" for setting up traceability with the target to support the chain partners with data that are foreseen to be distributed by the owner of the data, the farmer.

Further partners are a growing number of consulting offices that use different PROGIS technologies.

Beneficiaries

An integrated land management sees several beneficiaries, starting from the farmer or the advisors via science, ministries or also traders, export organizations, banks and insurance companies as well as land managers, utility managers, environmental- or risk experts, telecom companies or the public that has minimized risks, a better environment and higher quality of food and more bio-energy with less emission impact.

The technology allows, to setup complete new land management systems as well as setup of new advisory services.

Overall the benefit is enormous, nevertheless also the problem should be addressed: The organizational structure of an integrated system – and the nature works like an integrated system and not sector by sector – is complex and the existing structures must have the will to change what is not always the case and sometimes not an easy task for the participants. In any case one "super-

organization" on top of the existing ones like agriculture, forestry, water, environment etc. could be one solution.

Countries with no structures might even start faster and benefit earlier of such integrated systems, a huge chance for the South!

ICT Information centre – trust centre

ICT today is able to support such a model from farmer/advisor to regional systems till countrywide trust-centers and all the necessary communication between. Details are available on request from the author.

7 steps for a countrywide solution

For a country implementation a step by step approach is necessary, starting from a defined consortium (it is a must to integrate the important stakeholders of a country) via one or several pilot-regions (how many and the size depends on the country (size and complexity of agricultural regions), a detailed work-plan to put the project into life and later evaluate the details and optimize the model. After it, a slightly modified model according the local needs can be implemented step by step horizontally and vertically throughout the country.

EC co-funded projects 2009 – 2010

PROGIS is part of the Future Farm project, a FP7 project of the EC with 3.0 Mio € and 15 partners out of 10 European countries. PROGIS part is the technology expertise.

Further PROGIS was recently honored with a JRC-EC contract "Whole farm management system and information need at sustainable biomass production" where we could give recommendations for the further use of ICT within agriculture-forestry-environment and PROGIS was also invited to the EC Development Days in Stockholm 2009 as one of the very few private stakeholders, will be partner at the same event in Brussels in 2010 and was also honored to give a presentation at the Deforestation meeting of the EC Parliamentary Group in Brussels 2010.

Valuable & sustainable benefits

This is a summary of the benefits – there are more than on this page showed - as a result of an integrated model. A holistic ICT approach gives enormous benefits but needs detailed planning and change within the organization structures.

The valuation of the benefits gives a tremendous result; nevertheless in the future detailed verification has to be done together with local Institutes to give detailed and verified and country based results.

Beside economical benefits we can be sure that also ecological values give additional benefits as well as first time the value of the land can be shown and verified, something that every private owner and also the government must be interested in.

Based on detailed data and information, suddenly possibilities are here to organize conflicts coming out of a private ownership on one side and the social

responsibility on the other side. Social responsibility is important but can`t be always free of charge as the farmers tendency in such a case will be, to work against sustainability what is negative for all of us.

Food for thoughts
> As long as people have to less to eat, are greedy, any combination, the value of clear-cut or logged timber is higher than of nature, deforestation of forests will keep going!
> Europe has deforested its landscape by around 50% and now we explain – do not do this in Brasil or DR Congo! With what right?
> If we are sure that the world needs the forests optimized, we have to pay for them!
> Protection of a piece of land shows the highest interest of the general public on this land – this must reflect in a high value.
> I wrote 1985 the book „Air pollution and forest decline" and said: „We need more economical thinking, but the ecology has to get a value – ethical & €--!" I repeat this sentence today again! Some food for thoughts is shown at this slide – just read!

Vision: Agro-Forest-Renaissance
The last slide should be an optimistic one as since several years the agro-forest complex is worldwide in a pull-back – what in my eyes looking at the problems we have today was totally wrong.

A Russian named Kondratieff evaluated growth cycles during the last 150 years. All cycles are based on one principle: Several technologies together guided to something big; e.g. cars w/o rubber for tires and w/o petrol would not have been a success. If this was good for the world is another question, nevertheless the growth cycle "car mobility" started and was a fact.

The author of a Kondratieff book, Mr. Leo A. Nefiodow focused on several new technologies that are all in a pole position: Environment, health, biotechnology and informatics. When we take them all, we see as result - they focus to agriculture-forestry-environment-risk! Why?

Environment is managed in a large amount by farmers and foresters as well as health is let´s say 50% based on quality food coming from farmers also. Biotechnology is also embedded in farming and forestry as well as the last 47 slides should have shown some of the possibilities, informatics in the future will give and the impact again is towards agro-forestry.

Last but not least we have also external drivers like "Food for 9,5 bio people in 2050", "Bio-energy as an add on and sustainable energy source" and "Climate change as only one, nevertheless very important environmentally and risk caretaking impact".

Agriculture and forestry can support all these and will get an enormous renaissance because of all of the above mentioned facts!

An integrated system as above will need a decade to be implemented within a complete country, nevertheless we have to start now and enlarge it step by step if we want to manage the challenges of tomorrow – together – regarding food, biomass, environment and risk!