Greece - innovation 3:

PUBLIC PARTICIPATION AND CONSULTATION 3D-MAPPING TOOLS

University of Thessaly, Department of planning and regional development
www.uth.gr/en/

- **Short name:** PP & 3D-Mapping
- **Location:** Thessaly
- **HNV farming system:** Improvement of the pasture management. Reinforcement of cooperation between producers and all the other actors
- **Scale of operation:** Ability to change the scale of application (pastures in the entire LA-Thessaly). The most common application scale is the community
- **Timespan:** Over 15-year application and implementation of "PP &3D Mapping" at community level for the settlement of spatial problems (pasture overgrazing -land use conflicts etc).

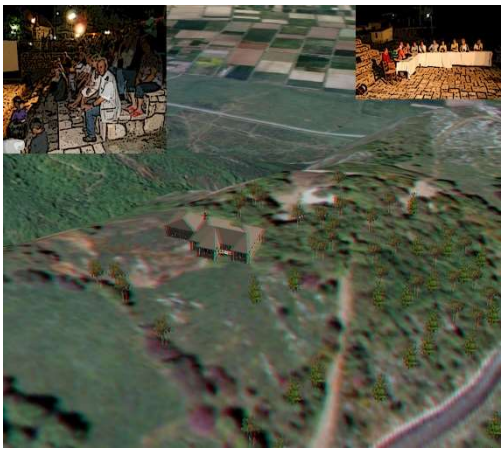

Figure 1

Problems addressed by this example

- Addressing the stocking density issue in the grazing zones that are placed close to the limits of the settlements and the livestock facilities.
- Reduction of conflicts between producers (livestock breeders, farmers, beekeepers) and public services (forestry department, Ministry of Agriculture etc.)
- Reduction of disputes between livestock breeders with the residents and the municipality for the movement of the herds.

The story in a nutshell

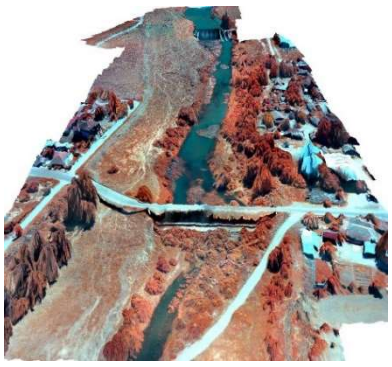

Figure 2

Within the framework of rural multifunctionality the Laboratory of Rural Space (LRS), Department of Planning and Regional Development of the University of Thessaly, has focused (for the last 15 years) on the development of innovative methodologies to enhance participatory planning and consensus. In this context the LRS has developed and implemented an innovative methodology of three dimensional interactive representations by using GIS & Remote Sensing and 3D computer graphics.
This is essentially the creation of "3D Virtual Worlds" with the ability to change scale, viewing position and virtual tour. The "PP & 3D-Mapping" is a Multi-stage Collaborative 3D Mapping tool for supporting the public Participation for landcover/Landuse management. The 3D interactive representations can function as a communication language between the various actors.

The objective of the innovation is dual:

- to strengthen the participation-communication of all the bodies (and producers) in the management of pastures and generally the HNV areas and
- the "bottom-up" collection of information, reliable and updated (creation of geadatabase), concerning the area where local society takes action,
- aiming at an on time and valid addressing of problems

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What does «PP & 3D-Mapping» achieve for HNV farming?

- Pasture management: Participation of livestock breeders in the dialogue for the rational use of grazing areas .
- Training the producers in order to understand the mulifunctionality of the space : Reduction of the conflicts between the various production groups but also creation of new cooperation opportunities (livestock breeding & rural tourism)

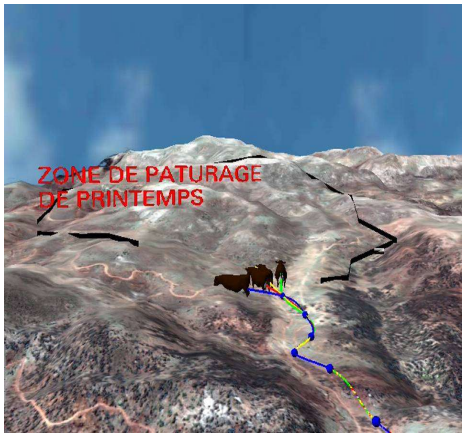

Figure 3

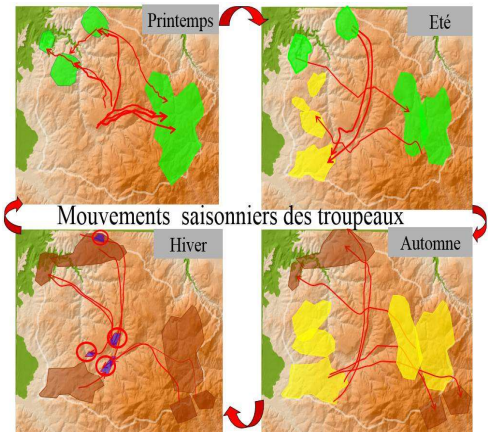

Figure 4

What's the issue that prompted the innovation?
The innovation was realized due to the need for a strong spatial tool (3D-GIS) that would support education/learning/activation of producers' participation in consultation procedures and decision making, around problems and interventions related to their space (diagnosis, evaluation, HNVf management).

Achievements?

- Functional incorporation of Geo-Informatics and 3D visualization into an integrated diagnosis and planning methodology in HNV areas
- Enhancement of participation and development of a dialogue between local production teams (livestock breeders, farmers etc.) and public bodies and specialists
- Mitigation of contradictions and understanding of the problems on space management between the involved bodies (forestry department, municipality, livestock breeders etc.)
- "Building" trust between groups with conflict of interests.

Economics of HNV farming
Indirect economic benefits: Optimization of livestock breeding through the implementation of pasture management plans that resulted in minimizing the basic cost that a pastoral holding has, buying forage

Maintaining or improving HN-values
Implementing the innovation contributes directly:

- To the improvement and protection of pastures' biodiversity. Implementation of rational grazing plans that resulted in
  - minimizing stocking density phenomena and
  - avoiding degradation and abandonment of remote pastures
- To the education and creation of sensitive, well informed and with active participation producers, on issues concerning sustainable management of the relationship between the holding and the natural environment.

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How does «PP & 3D-Mapping» respond to HNV LINK innovation themes

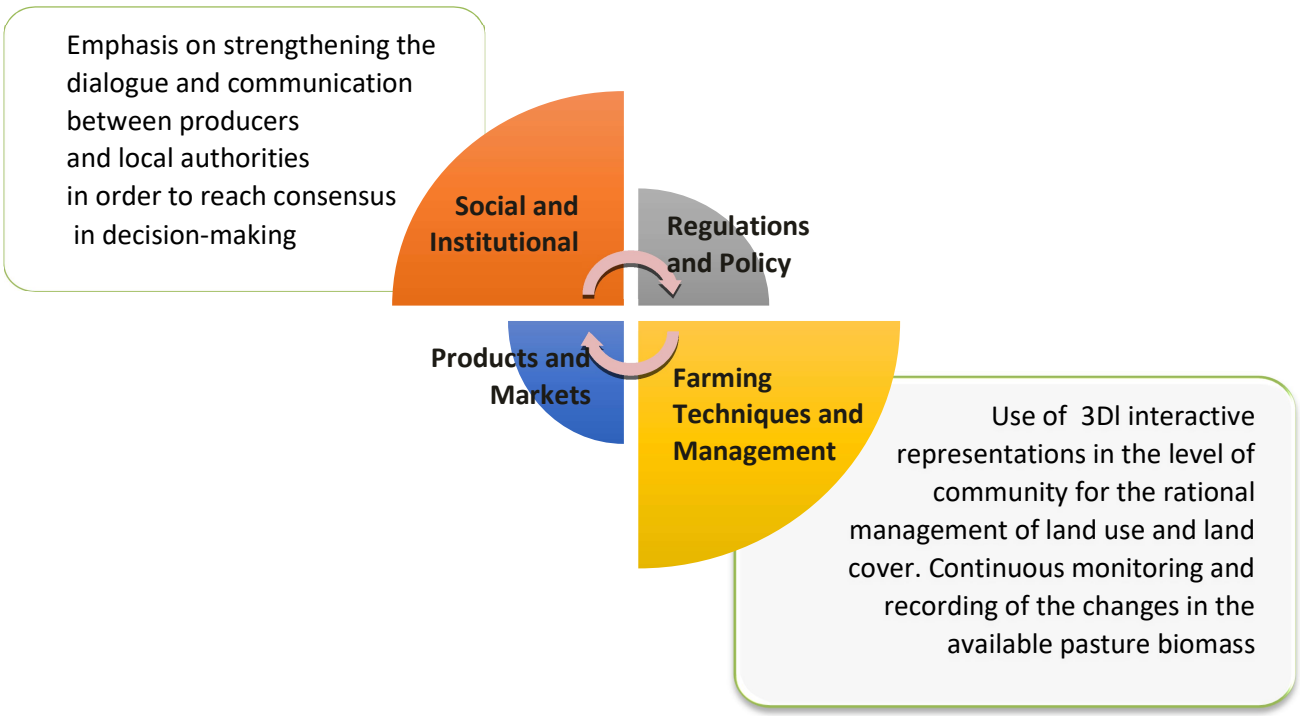

Figure 5 *The framework HNV-Link used for evaluating innovations for high nature value farming.*

Social and Institutional

- "PP & 3D-Mapping" innovation provides local authorities with a communication and information tool for the producers and other actors that are active in the area (NGO's, environmental associations, etc.)
- Familiarizing local societies with advanced technological tools like 3D interactive mapping for the diagnosis and management of the space favors:
- Improvement of spatial perception and the knowledge that inhabitants have for the place they live
- Participation of actors in high scale participatory procedures like: cooperation and transfer of power

Figure 6 *Public-Participation in Ellinopirgos village*

Farm techniques and management

"PP & 3D-Mapping" innovation contributes:

- to the continuous collection of new information in the database with no particular cost, resulting in the direct knowledge of the problems that occur (drought, floods, erosion phenomena)
- to the estimation of forage biomass for animals in the grazing zones depending on the climate conditions
- to the delimitation of exclusion/suitability zones to avoid conflicts between the various production groups

Figure 7

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The process that made it happen and critical factors for success

- Participation of a support body in the installation and operation of "PP & 3D-Mapping"
- Engagement of local society in the various stages of the creation of the 3D interactive Virtual World
- Coverage of the fixed and operational costs for the installation, operation and maintenance of "PP & 3D-Mapping"

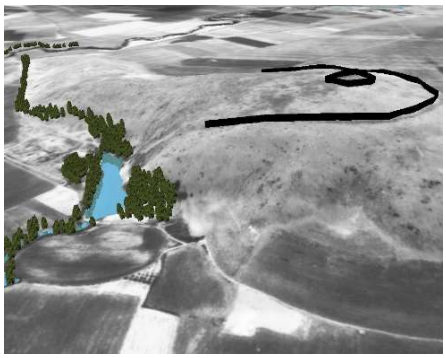

Figure 8 *Scenario: Lake Reconstruction*

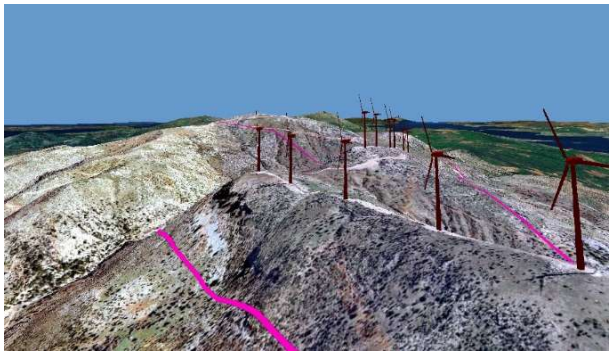

Figure 9 *Scenario: Wind farm installation*

Technological Issues

- The cost of the supporting software and hardware. Funding is required for the installation and operation of the system at the level of the Municipality
- The cost to get high resolution geospatial data: Aerial Photos /Satellite images /Digital Elevation Models (DEM)
- The relationship between the accuracy of the model and its construction cost

GIS-Remote Sensing technologies are becoming more and more friendly and easy to use. New trends: (a) Open source software that support 3D-GIS public participation procedures and (b) Free disposal of high resolution geospatial data by government bodies.
Technology is evolving fast:

- New, high resolution and low cost digital backgrounds are emerging in the market, creating new spatial visualization possibilities
- New, low cost technologies provide very high spatial resolution data offering at the same time the ability to perform multiple surveys in one day (Drones)

Methodological Issues
For the completion and effectiveness of the tool to be achieved three stages are required:

- Participation of a group of producers in the enrichment of the three-dimensional background with auxiliary information (place names, changes in land use, areas of particular interest etc.)
- Participation of a group of producers for the recording and representation of the spatial and temporal management system concerning land use (routes and grazing-crop areas)
- Training and acceptance, by the area's participants, of the use of three-dimensional visual representations as a tool of: (a) communication and dialogue, (b) collecting accurate data

Figure 10

Figure 11

Figure 12

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Pasture zones	Timetable			
	Spring	Summer	Autumn	Winter
A				
B				
Γ				
Δ				

Table 1 *Calendar with the movement of the livestock holding*

Lessons learnt from «PP & 3D-Mapping» and its potential replication

- Successful implementation and operation of "PP & 3D-Mapping" depends on its integration into collective coordination and cooperation plans like Terra Thessalia
- 3D representations give the opportunity to extract a huge amount of information from local society. Its coding and utilization is a big challenge.
- The basic advantage of "PP & 3D-Mapping": application ability in both local and regional scale.

Lessons learned

- The greater the detail and fidelity in spatial 3D representations, the more active the participation of the livestock breeders/farmers in the diagnosis, consultation, planning and management procedure.
- A need for more detailed 3D representations, especially for the creation of location scenarios and decision making. Otherwise there is rejection and failure of the consultation process
- Even people with lower spatial perception can understand the space in which they live and participate in consultations and discussions using the 3D interactive representations
- Good preparation is required for the real-time recording of the very large amount of information given by the participants during the consultations.
- Slow response to the imprinting of information slows down the dialogue and the participants are thus getting tired

Replicable in other areas?

The municipalities and other collective organizations (social, professional) can adopt the innovation "PP &3D Mapping" as a tool of spatial management and reinforcement of participatory procedures in their regions. The whole project's success will depend on the possibility to create a technical support team in cooperation with research bodies. In this case it is suggested that the municipalities set up communication and cooperation centers with area's local bodies equipped with a 3D interactive GIS. These centers will be responsible for: a) "educating" and familiarizing the residents and producers of the municipality with 3D representation of the space in which they live enhancing their participation in local meetings and b) encouraging the citizens (especially producers) to participate in the enrichment of the 3D model with information (recording of pollution incidents) helping thus to better manage space.

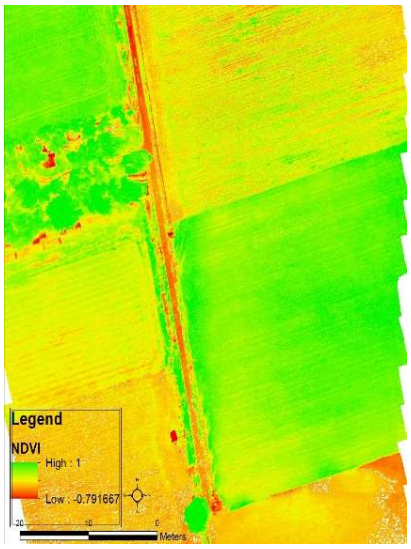

Figure 13 *Drone mapping: biomass estimation*

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Greece – innovation 3:

GPS TRACKING MONITORING AND CERTIFICATION OF EXTENSIVE LIVESTOCK-FARMING

University of Thessaly, Department of planning and regional development
www.uth.gr/en/

- **Short name:** GPS- tracking to extensive livestock (GPS-tracking)
- **Location:** Thessaly (LA)
- **HNV farming system:** Certification of the holding's pastoral practices in the market. Monitoring the implementation of a grazing plan.
- **Scale of operation:** On the scale of a livestook farming level
- **Timespan:** Tracking the movement of 15 extensive holdings for 2015-2016 under the Lactimed programme. Today, Terra Thessalia has assumed this application

Figure 1

Problems addressed by this example

- Certification of the herd's extensibility in order to support the effort to increase the added value of the raw material (milk, meat) and the final dairy products
- Tackling conflicts between farmers-livestock breeders, using GPS geofences and other functions
- rapid troubleshooting for free-range cattles

The story in a nutshell

Within the framework of the European programme Lactimed, the Territorial Participatory Guarantee System (TPGS) was developed, part of which is the GPS-tracking system. Initially a monitoring platform (server, softwares, etc) was created in order to record the geographical position of the moving herds in a daily basis. At the same time, the livestock breeders that participated in the programme, were trained in the use and good operation of the GPS in their animals. The aim of this innovation is manyfold: (a) to certify the extensive livestock (sheep farming in mountain and semi-mountain areas) giving the added value to the corresponding dairy products (marketing); (b) to understand and facilitate livestock movement; (c) to prevent conflicts between farmers and forestry services using GPS geofences and other functions; (d) to strengthen the active participation of the producers in the management of HNV areas; (e) to collect data for the control of the pasture quality (quantity of biomass, biodiversity/plant species) by specialists (range scientists, environmentalists etc.)

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What does «GPS-tracking » achieve for HNV farming?

- Market/products: using GPS-tracking undeniably contributes
  - to the guarantee of herding pastoral practices
  - to the reinforcement of the confidence with consumers
- Management of the holdings:
  - Identification of quality pastures based on animal behavior
  - Contribution to the design and implementation of spatial and temporal grazing systems
- Creation of an application team with the participation of producers, researchers and technicians

Figure 2 *The GPS-tracking interface*

What's the issue that prompted the innovation?
The application was implemented due to the need for a reliable tool accessible to consumers that would also guarantee the grazing of the herds.

Achievements?

- Successful implementation of GPS-tracking on all 15 holdings revealed the interest of livestock breeders to promote the practices and values of their pastoral system by adopting advanced technologies, aiming at the same time at a more directly informed consumer.
- Informing livestock breeders about the reasons for installing GPS-tracking on their holding and its contribution to the implementation of the participatory guarantee system helped them shape a more optimistic view for the future of their business and at the same time show interest for the continuation of the monitoring programme.
- Continuous feeding of a geographic database with information concerning the grazing profile of every holding on a daily basis. These data can be used by a range of scientists and specialized zootechnicians to analyze ration.

Economics of HNV farming
Direct financial benefits: GPS-tracking, as a certification tool for the grazing of the herds, contributes to the increase of products' added value.
Indirect financial benefits: Especially in cattle holdings, tracking the movement of the animals in the countryside (free range for approximately 6 months) helps to save sick-trapped animals, minimizing the cost from animal losses (sometimes this is equivalent to a few thousand euros).

Maintaining or improving HN-values
The implementation of GPS-tracking in animal movement contributes directly to the improvement and protection of biodiversity in the pastures. Recording the routes and grazing zones, thus stocking density as well, would potentially help to better manage pastures and avoid their marginalization and land abandonment

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How does «GPS-tracking» respond to the HNV LINK innovation themes?

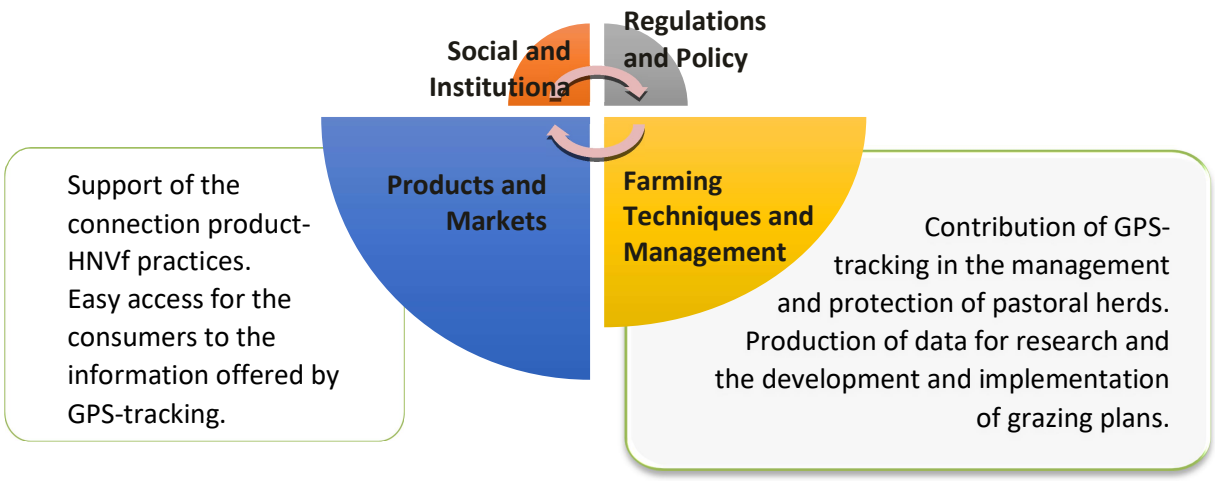

Figure 3 *The framework HNV-Link used for evaluating innovations for high nature value farming.*

Products and markets
GPS-tracking innovation offers to the market a reliable certification tool for the products coming from pastoral and free range holdings.
Potentially this innovation contributes to the reinforcement of the trust between the most demanding consumers, who seek the distinction between HNVf products, and those from holdings with intensive production system

Farm techniques and management
GPS-tracking innovation contribution:

- Better monitoring of the herd in the difficult and demanding environment of the semi-mountainous and mountainous regions (grazing management, estimation of the forage biomass consumed by animals)
- Familiarization of producers with advanced technological tools on diagnosis and space management (using GPS - tablet – smartphones)

The process that made it happen and critical factors for success

- A support body for the installation and operation of the "GPS-tracking" was secured
- Provision of information and breeders' acceptance for the adoption of a GPS-tracking system
- Coverage of fixed and operational costs of the GPS-tracking system

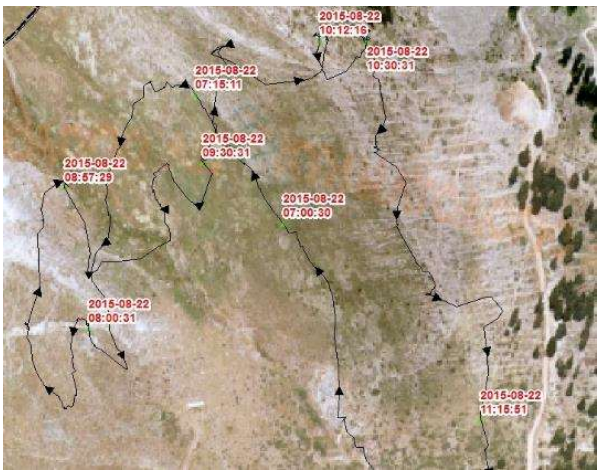

Figure 5 *GPS record: Spatiotemporal movement of a flock*

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Basic issues that need to be resolved:

- Increasing the battery life before its next charging process, keeping at the same time the system's cost and weight low. Experiments are underway to expand the GPS operation, from 15 days to 3-4 months.
- The cost for special GPS that meet specific protocols and guarantee their good operation in difficult weather conditions (strong sunshine, rainfall etc.)
- It is necessary to train livestock breeders:
    a) on the operation and use of the GPS (battery charging) in order to prolong its life expectancy
    b) on the tracking of the herd (use of tablet - smartphone). However, in many cases new farmers are familiarizing quickly with new technologies minimizing thus the learning curve
- Finding the funds for the installation and operation of the system. Fixed costs: buying a server, GPS devices and their between interconnectivity for the operation of the GPS-tracking system. There are also operational costs linked with the daily monitoring of the GPS function, its maintenance and a monthly mobile telephone subscription.

Lessons learnt from this innovation example, and its potential replication

- The successful implementation of "GPS-Tracking" depends on its integration in a collective cooperation and coordination plan like for instance Terra Thessalia or in an integrated guarantee system.
- "GPS-Tracking" innovation is an educational process for the introduction of a new technology adapted in the management and promotion of the HNVf character.
- GPS-Tracking" system can be implemented in every region

Figure 4 *the GPS device*

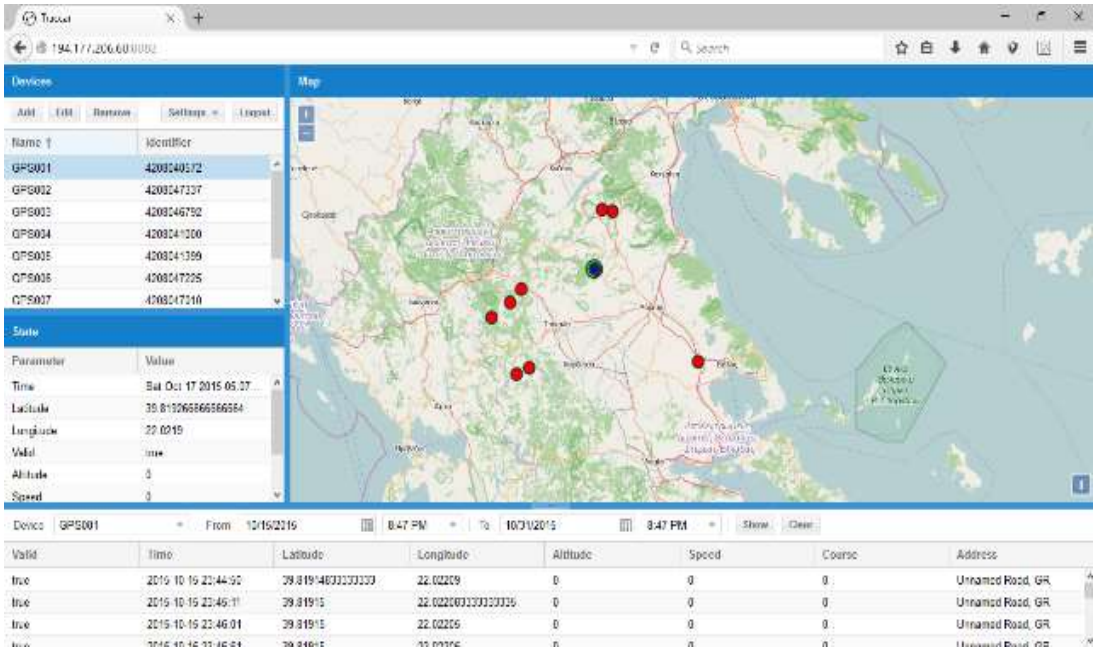

Figure 5 *Monitoring the flocks movements through the GPS-tracking platform*

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Overall lesson

"GPS-Tracking" innovation is for the breeders a collective educational and practical process of learning and using a powerful technological tool in order to highlight themselves the HNV characteristics of their holding and the specificities of their products

Replicable in other areas?

GPS-tracking can be installed on any extensive livestock holding within the Greek territory provided there is a GSM signal (Global System for Mobile communications). The movements will be recorded on a server while at the same time every breeder will be able to control, almost in real time, the movement of his herd. The recording and management of the data could be carried out by a certification body for the extensiveness of the herd. This body would provide support to the breeders and specialists by supplying the spatial and temporal data from the herd's movement.

Figure 6

Links:

https://www.youtube.com/watch?v=r7m3LxbbWAQ

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