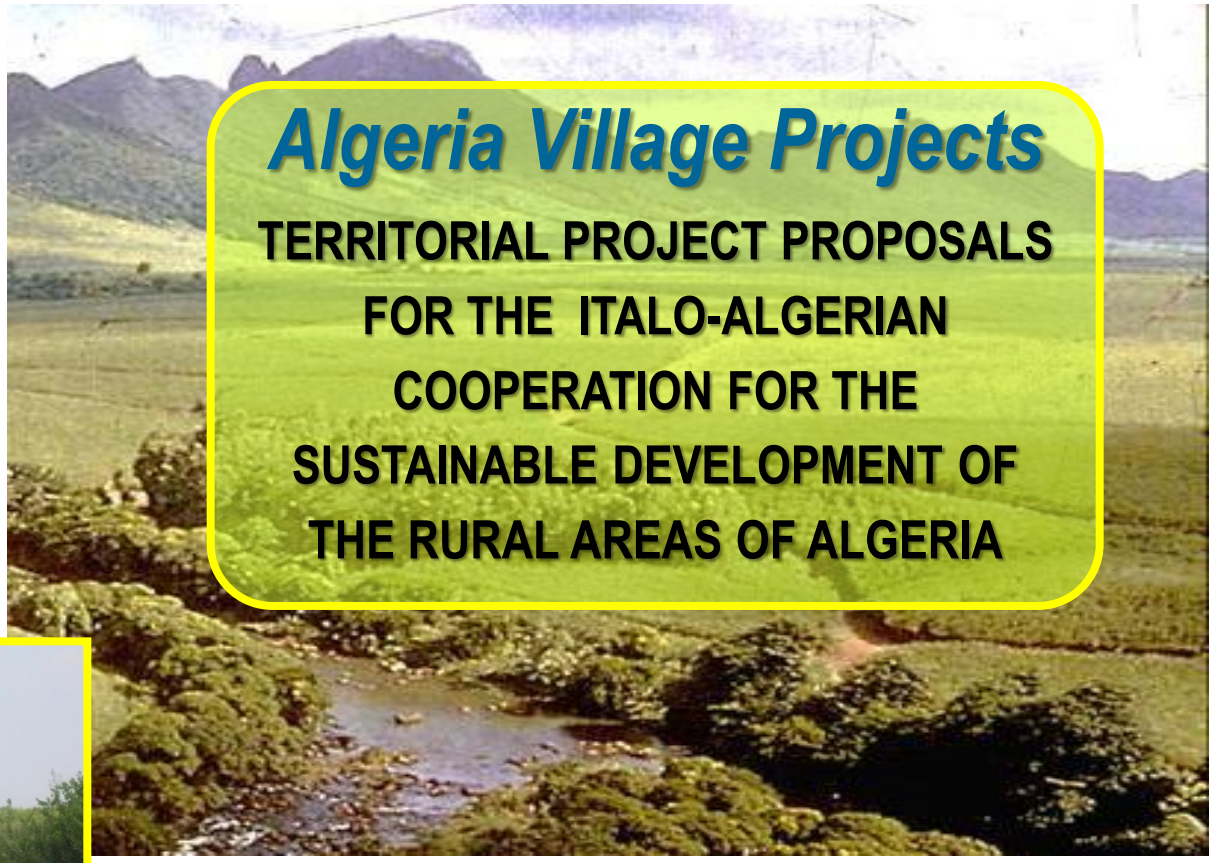


Algeria Village Projects

TERRITORIAL PROJECT PROPOSALS FOR THE ITALO-ALGERIAN COOPERATION FOR THE SUSTAINABLE DEVELOPMENT OF THE RURAL AREAS OF ALGERIA

PRE-FEASIBILITY

Turin, Italy
December 2014

AgroVeritas Consortium

Istituto di Ricerca
di Dr. Arioli e C. S.a.s.

AgroVeritas Consortium

SUMMARY

CHAPTER # 1 MAIN TERRITORIAL TOPICS.

CHAPTER # 2 PROJECT PROPOSAL MATRIXES.

- **PARAGRAPH # 1** ITALO-ALGERIAN PROJECT PROPOSALS AND RELATED MINISTRIES.
- **PARAGRAPH # 2** ITALO-ALGERIAN PROJECT PROPOSALS TOWARDS TRAINING & KNOW-HOW TRANSFER.
- **PARAGRAPH # 3** ITALO-ALGERIAN PROJECT PROPOSALS TOWARDS THE SPECIFIC OBJECTIVES OF THE SOCIAL-RURAL SUSTAINABLE DEVELOPMENT
- **PARAGRAPH # 4** ITALO-ALGERIAN PROJECT PROPOSALS. INTENSITY OF INTERACTION AMONG PROJECT PROPOSALS.
- **PARAGRAPH # 5** ITALO-ALGERIAN PROJECT PROPOSALS. MAIN FLOWS OF INTERACTION AMONG PROJECT PROPOSALS.
- **PARAGRAPH # 6** PROJECT SCHEDULES # 1 / # 11.

CHAPTER # 3 TTT TRAINING PROGRAMME - Train the Trainers & the Trainees (focus).

CHAPTER 1

MAIN TERRITORIAL TOPICS

LECTURING OF PROJECT PROPOSALS

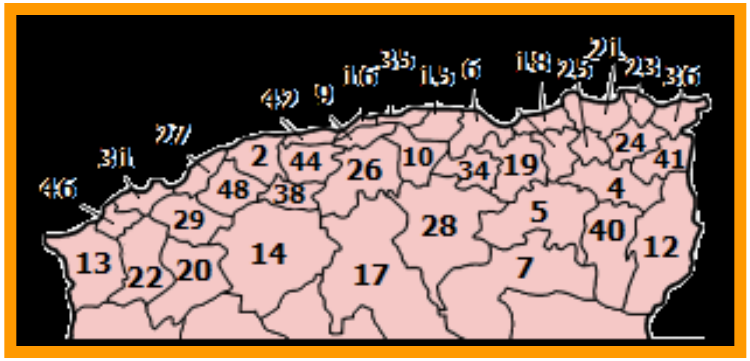
The Lecturer of the project proposals:

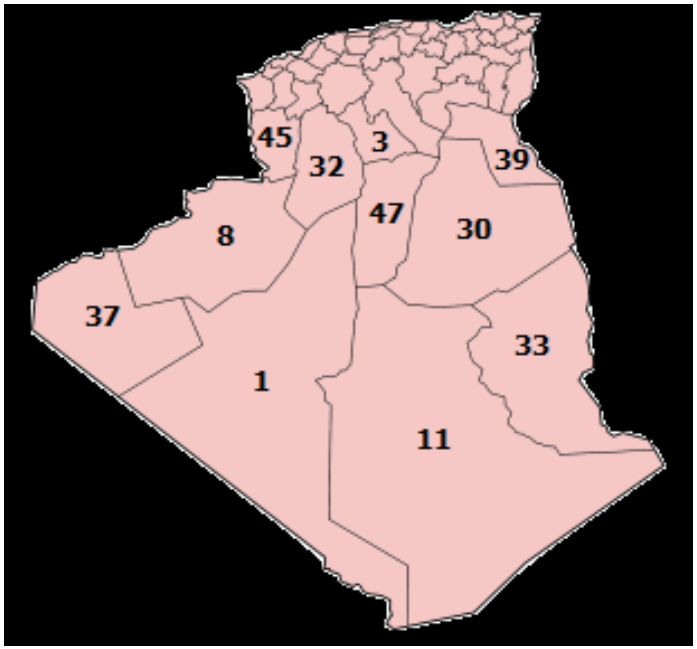
- ✓ **Prof. Dr. Alessandro Arioli**
  Agronomist
  Director of the Department of
  Environmental and Social Sciences
  St. John International University
  New Hampshire (USA)
  Italy Campus of Vinovo (To)
  E-mail: a.arioli@sjiu.it

THE TEAM IS A MULTI-DISCIPLINE NETWORK OF EXPERTS WITH A 30-YEAR EXPERIENCE IN INTERNATIONAL PROJECTS AND PLANNING IN EUROPEAN, SOUTH AMERICAN, AFRICAN, MIDDLE-EASTERN AND FAR-EASTERN COUNTRIES FOR "SUSTAINABLE DEVELOPMENT" AND "ETHIC BUSINESS". ALL THE CVs ARE AVAILABLE IN ENGLISH.

ALGERIA - MAIN NATIONAL TERRITORIAL DATA

#	Wilaya	Area (km²)	Population
1	Adrar	402,197	439,700
2	Chlef	4,975	1,013,718
3	Laghouat	25,057	477,328
4	Oum El Bouaghi	6,768	644,364
5	Batna	12,192	1,128,030
6	Béjaïa	3,268	915,835
7	Biskra	20,986	730,262
8	Béchar	161,400	274,866
9	Blida	1,696	1,009,892
10	Bouïra	4,439	694,750
11	Tamanrasset	556,200	198,691
12	Tébessa	14,227	657,227
13	Tlemcen	9,061	945,525
14	Tiaret	20,673	842,060
15	Tizi Ouzou	3,568	1,119,646
16	Algiers	273	2,947,461
17	Djelfa	66,415	1,223,223
18	Jijel	2,577	634,412
19	Sétif	6,504	1,496,150
20	Saïda	6,764	328,685
21	Skikda	4,026	904,195
22	Sidi Bel Abbès	9,150	603,369
23	Annaba	1,439	640,050
24	Guelma	4,101	482,261





#	Wilaya	Area (km²)	Population
25	Constantine	2,187	943,112
26	Médéa	8,866	830,943
27	Mostaganem	2,269	746,947
28	M'Sila	18,718	991,846
29	Mascara	5,941	780,959
30	Ouargla	211,980	552,539
31	Oran	2,114	1,584,607
32	El Bayadh	78,870	262,187
33	Illizi	285,000	54,490
34	Bordj Bou Arréridj	4,115	634,396
35	Boumerdes	1,591	795,019
36	El Taref	3,339	411,783
37	Tindouf	58,193	159,000
38	Tissemsilt	3,152	296,366
39	El Oued	54,573	673,934
40	Khenchela	9,811	384,268
41	Souk Ahras	4,541	440,299
42	Tipaza	2,166	617,661
43	Mila	9,375	768,419
44	Ain Defla	4,897	771,890
45	Naâma	29,950	209,470
46	Ain Timouchent	2,376	384,565
47	Ghardaia	86,105	375,988
48	Relizane	4,870	733,060

CHAPTER 2

PROJECT PROPOSAL MATRIXES

ITALO-ALGERIAN PROJECT PROPOSALS AND RELATED MINISTRIES

PROJECTS ► / MINISTRIES	1	2	3	4	5	6	7	8	9	10	11
ECONOMICAL DEVELOPMENT			OILS		FOOD						
AGRICULTURE	DRIP	MULCH		PEANUT		BUFF					
ENVIRONMENT							PHYTO	WASTE		DRON	
ENERGY									HYDRO		BGAS

PROJECT PROPOSALS

1) Drip Irrigation applied to staple food crops
2) Bio-degradable plastic mulching for staple food crops
3) Vegetable oils crops & squeezing micro-units for rural villages
4) Ground-nut development: genetics, dry grains, oils, oil-cakes
5) Quality-food containerized micro-factory units for EU safe & hygienic food: cheese, bread, dry vegetables conserves, ice-creams
6) Buffalo livestock project for wetlands
7) Phyto-depuration for the recovery of dirty waters from civil and industrial activities
8) Bio-gasoil production from urban waste organic fraction
9) Mini-Micro hydro-electric power units for rural renewable energy
10) Flying Automatic Drones for territorial monitoring
11) Biogas containerized micro-factory units for residual biomasses

ACRONYMS

1) DRIP
2) MULCH
3) OILS
4) PEANUT
5) FOOD
6) BUFF
7) PHYTO
8) WASTE
9) HYDRO
10) DRON
11) BGAS

ITALO-ALGERIAN PROJECT PROPOSALS TOWARDS TRAINING & KNOW-HOW TRANSFER

PROJECTS ► MINISTRIES	HORIZONTAL MULTI-DISCIPLINE TRAINING & KNOW-HOW TRANSFER PROGRAMMES
ECONOMICAL DEVELOPMENT AGRICULTURE ENVIRONMENT ENERGY	The guidelines of the "TTT Training Programme – Train the Trainers & the Trainees Training Programme for the sustainable rural development of Albania" • To allow Albania to become the "Country Paradigm" for Eastern European scenarios through a new modular and glocal approach to the sustainable rural development. • To assist Algerian People to exploit their natural resources in the fields of Agriculture at large in a modern, efficient and above all sustainable way. • To transfer technological innovation to Albania, which will benefit both existing and emerging farmers to enhance production, either in quantity or in quality. • To promote the inflow from Italy to Albania of know-how and expertise. • To allow Albania to become a permanent forum that facilitates the links among technology, production and markets. • To promote capacity building, capacity development and empowerment of historically disadvantaged people.

The present proposal is structured on <u>two different levels</u> of training and know-how transfer:

- **Level "A"** = **«TRAIN THE TRAINERS PROGRAMME»**, dedicated to top level of professionals in the country, including public experts, who play a role of local Teachers of local Trainees.
  - Entry level for participants = university degree, senior consultants with minimum 10 years of professional experience in the field.
- **Level "B"** = **«TRAIN THE TRAINEES PROGRAMME»**, dedicated to the following categories of Algerian territorial operators:
  - young technicians [just graduated, or just diplomated from (agricultural) high school] and junior consultants;
  - farmers and technical operators.

ITALO-ALGERIAN PROJECT PROPOSALS ADDRESSED TO SPECIFIC OBJECTIVES OF SOCIAL-RURAL SUSTAINABLE DEVELOPMENT

OBJECTIVES OF THE CALL / PROJECTS	1 DRIP	2 MULCH	3 OILS	4 PEANUT	5 FOOD	6 BUFF	7 PHYTO	8 WASTE	9 HYDRO	10 DRON	11 BGAS
To promote Vocational Education and Training	5	5	5	5	5	5	5	5	5	5	5
To support programme of preventive health care	3	3	4	3	4	2	3	3	1	1	2
To sustain social inclusion of those at risk of poverty and exclusion	3	2	3	3	2	2	1	1	1	1	1
To support employment programmes for young people, women persons with disabilities	4	4	4	3	5	3	2	2	2	1	3
To encourage rural territories to explore new ways to becom or tom remain competitive	5	5	5	5	4	5	2	2	1	1	4

LEGEND

1 = very low indirect impact on the objective 2 = low impact on the objective 3 = direct positive impact on the objective 4 = very positive impact on the objective 5 = strategic and very deep impact on the objective

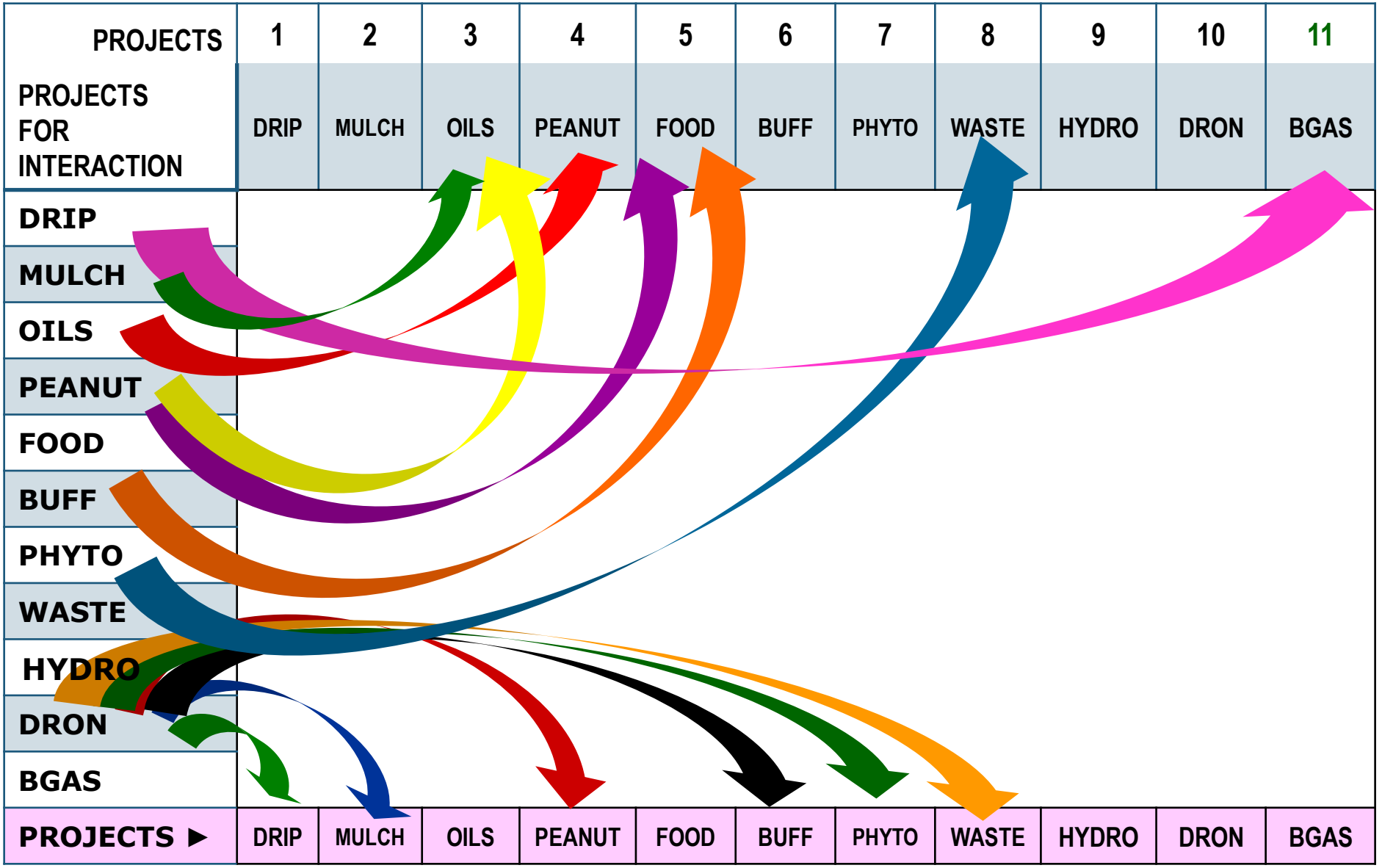
ITALO-ALGERIAN PROJECT PROPOSALS
INTENSITY OF INTERACTION AMONG PROJECT PROPOSALS

PROJECTS	1	2	3	4	5	6	7	8	9	10	11
PROJECTS FOR INTERACTION	DRIP	MULCH	OILS	PEANUT	FOOD	BUFF	PHYTO	WASTE	HYDRO	DRON	BGAS
DRIP		3	2	4	3	1	1	1	1	1	3
MULCH	3		4	4	1	1	1	1	1	1	3
OILS	2	4		5	5	1	1	1	1	1	2
PEANUT	4	4	5		5	1	1	1	1	1	4
FOOD	3	1	5	5		5	1	1	1	1	4
BUFF	1	1	1	1	5		1	1	1	1	5
PHYTO	1	1	1	1	1	1		5	1	1	5
WASTE	1	1	1	1	1	1	5		1	1	5
HYDRO	1	1	1	1	1	1	1	1		2	1
DRON	4	4	2	4	1	4	4	4	3		3
BGAS	3	3	2	3	1	5	5	5	1	1	

LEGEND

1 = lack of interaction
2 = low interaction
3 = medium interaction
4 = deep interaction
5 = total interaction with interdependence

ITALO-ALGERIAN PROJECT PROPOSALS
MAIN FLOWS OF INTERACTION AMONG PROJECT PROPOSALS



PROJECT SCHEDULE # 1

PROJECTS ► / MINISTRY	1								
AGRICULTURE	DRIP								

PROJECT PROPOSAL

1) Drip Irrigation applied to staple food crops

ACRONYM

1) DRIP

PROJECT SCHEDULE - RESUME

- The project proposal consists of the innovative application of the principals of “localization of water, nutrients, bio-technological inputs and chemicals directly to the rooting system of the plants, through proper “drip lines” purposely placed into the plot.
- The technology allows to obtain some priority results for the economical, environmental, agricultural and food-security scenarios of Albania.
- First of all the water conservation obtained through a scientific management of each single field allows a water-saving till 50 times less water per hectare in comparison with traditional “furrow irrigation”. Water-saving approach is perfectly aligned with FAO worldwide goals of “More crop per drop”.
- The distribution of proper additives inside the water (“fertirrigation” technology) allows to minimize the use of chemicals (fertilizers and pesticides).
- The drip irrigation system works at very low pressure of the water inside pipelines: so, the energy consumption is significantly lower than in traditional sprinkling systems (e.g. till -600% energy requirement in comparison with rolling typhoons).
- Quality and quantity of vegetable dry matter production per unit of surface is significantly increased (usually from +40 to +100% of yield per hectare) in comparison with traditional technologies.
- The project proposal consists of the implementation of a “Pilot demonstrative farms” dedicated to specialized cultivation of maize (corn), beans, sunflower, ground-nut (peanuts), dwarf tomatoes, peppers, squash (zucchini), sweet pepper, okra, potato crops with careful benchmarks.
- The pilot-farm unit will be used for the two training and know-how transfer activities (train-the-trainers and train-the-trainees programs).

PROJECT SCHEDULE # 2

PROJECTS ►		2							
MINISTRY									
AGRICULTURE		MULCH							

PROJECT PROPOSAL

ACRONYM

2) Bio-degradable plastic mulching for staple food crops

2) MULCH

- The project proposal for BIO-DEGRADABLE PLASTIC MULCHING is revolutionary, according to the properties of the thin pplumeric shhets which are posed over the soil during the usual sowyng operations. The new combined machine (plastic mulching applicator + sowing pneumatic machine) allows to apply an integrated technology to the crops with higher yield without irrigation (comparable tot he yield of irrigated crops), lower use of fertilizers, lower use of pesticides, lower consumption of fuels, shorter duration of the crop cycle.
- The innovative COMBINED MULCHING-&-SOWING MACHINE allows the contemporary application to the soil of the bio-polimeric biodegradable mulching with direct sowing of maize, cotton, beans, sunflower, ground-nut and sorghum crops.
- This technology determinates a perfect germination of maize, sorghum, sunflower, beans, etc., supported by the action of accumulation of condensated steam made by the bio-polimeric mulching in the soil.
- The effect of steam condensation is produced by the physlcal properties of the plastic sheet, which is permeable to UV rays (provided by the sunlight) and impermeable to IR rays (emitted by the soil): these characteristics allow water evaporation and superficial steam's condensation from underground soil layers.
- The machine is automatic, with innovative distribution system, for the planting of grasses and corn seeds with a diameter greater than 4 mm or within capsules.
- SMP seed drill is used for mulching of pre-sowing plans using plastic or biodegradable cellulose film. It can be also equipped with drip irrigation system by the laying of a hose under the film.
- Working features: the front roller levels the ground and prepare the seed plan - the central roller lays the film - the central wheels ensure the constant contact of the film to the ground, facilitating its ridging - the rear plows-hares ridge the soil at the sides of the film, blocking it in position - the cylinders, on the wheels of sowing, after removing the seeds from the appropriate hoppers pneumatically, penetrate the soil by piercing the film. When each cylinder will be in a position perpendicular to the ground, releasing the seed – the rear small wheels compact the soil after the happened one seed.

PROJECT SCHEDULE # 3

PROJECTS ►			3						
MINISTRY									
ECONOMICAL DEVELOPMENT			OILS						

PROJECT PROPOSAL

3) Vegetable oils crops & squeezing micro-units for rural villages

ACRONYM

3) OILS

PROJECT SCHEDULE - RESUME

- The project proposal consists of the realization of proper innovative “mini / micro units for oil extraction” through special small machines, which are constructed following the tradition of famous Italian handicraftsmen.
- The process is totally “solvent-free”, without any kind of chemical practice.
- This food supply chain “from farm to fork” allows to introduce new oil crops, and/or to improve quality and quantity of traditional yields of similar products.
- The mix of edible oleaginous crops is inclusive of traditional oil crops, such as: rapeseed, sunflower, sesame, cardamom (well know local species), completed by the innovative proteic-&-oleaginous crop fit for the Algerian environment: the ground-nut.
- The list of oleaginous species is inclusive of sustainable crops dedicated to vegetable oil production, either for food or for biofuels & lubricants targets.
- Having said this, the territorial mix of edible oleaginous crops adaptable to the Algerian environment allows to implement a successful vegetable oils supply-chain in Albania, for the production of dedicated oils for food and biofuels, as weel as special oil-cakes for feedstuff. So, the present project proposal is addressed to a multi-functional range of utilizations.
- The performances of small squeezing machines (for instance, the smallest model squeezes 30 kg/hour dry seeds) correspondent to the production of about 10 kg oil/hour and 20 kg/hour of oil-cake in pellets (feedstuff for livestock).
- The project proposals is addressed to any rural community, in the aim of the construction of a powerful local supply-chain for edible vegetable oil (healthy food, rich in anti-oxidant components without any kind of industrial treatment: no de-coloration, no de-aromatization, no extraction with chemical products). These oils are also fit for food preservation («vegetable preserves»).

PROJECT SCHEDULE # 4

PROJECTS ►				4					
MINISTRY									
AGRICULTURE				PEANUT					

PROJECT PROPOSAL

4) Ground-nut development: genetics, dry grains, oils, oil-cakes

ACRONYM

4) PEANUT

PROJECT SCHEDULE - RESUME

- The peanut project proposal is referred to the ex-novo implementation of ground-nut crops in the territorial sandy areas of Albania.
- The ground-nut (“peanuts”), latin name *Arachis hypogaea*, is an useful herbaceous plant of the *Leguminosae* botanic family, so the plant is self-sufficiency for its nitrogen need through the natural nitrogen fixation provided by specific rhizo-bacteria (*Rhizobium leguminosarum*) into the soil of N_2 from the atmosphere.
- Thanks to their natural bacterial nitrogen fixation, the crop is totally “mineral nitrogen-free”, without any need of supplementary nitrogen supply through chemical fertilizers.
- This food supply chain of “Ground-nut from farm to fork” allows to introduce in Albania a traditional crop, which is innovative for Algerian rural areas.
- Furthermore, ground-nut (alias “arachis”) crop provides either fat components (the oil) or proteic matter, like all pulses.
- The high proteinic content in ground-nut’s seeds allows to obtain proteinic oil-cakes fro seeds’ squeezing.
- The oil is perfectly edible, but in case of wet conditions of harvested seeds the risk of production of micotoxins inside oil and oil-cake may seriously affect the production.
- The project proposal consists of the realization of the whole ground-nut supply cain, starting from seeds multiplication. The market for good seeds is very large, cocnernign all the mediterranean basin and all Southern and Eastern EU Countries.
- In short terms, ground-nut may represents a strategic new crop for all the Balkan scenarios.

PROJECT SCHEDULE # 5

PROJECTS ► / MINISTRIES					5				
ECONOMICAL DEVELOPMENT					FOOD				

PROJECT PROPOSAL

ACRONYM

5) Quality-food containerized micro-factory units for EU safe & hygienic food: cheese, bread, dry vegetables conserves, ice-creams

5) FOOD

PROJECT SCHEDULE - RESUME

- The project proposal consists of the innovative concept of “standardized micro-food-factories”, fully equipped inside a 20-feet container with “food-grade performances” regarding hygienic conditions, thermal isolation, water proof assembling.
- The standard containerized structure is fit for many food processing lines: preserves factory, cheese factory (mozzarella & ricotta & yogurt factory), bread & pizza & focaccia factory, Italian ice-creams factory, Italian chocolate & coffee factory, fresh Italian pasta factory.
- All the food factories ale self-sufficient for equipment, hygienic options (including toilets) and energy production.
- All the food factories can be well-finished in two releases: “the food factory” and “the Italian street food shop”.
- Usually, the concept of “food factory” is suitable for rural areas without commercial infrastructure.
- The “street food shop concept” is mainly suitable for structured communities (towns, harbour areas, etc.) where the concept of flexible and transferable shops is a win-win solution for quality and healthy food “the “fast good food” of the Italian tradition).
- The present project proposal is focused on the construction of half a dozen modular pilot micro-factories / street food shops, also fit for training courses to the proper quality food management.

PROJECT SCHEDULE # 6

PROJECTS ► / MINISTRIES						6			
AGRICULTURE						BUFF			

PROJECT PROPOSAL

6) Buffalo livestock project for wetlands

ACRONYM

6) BUFF

PROJECT SCHEDULE - RESUME

- The project proposal concerns the introduction of "Italian buffalos" in wetlands and soft-soil areas of the Algerian rural areas.
- The "Italian buffalo"is a selected species which allows to obtain the famous Italian cheeses (like "buffalo mozzarella"), known worldwide for the high quality and delicious taste. The introduction of the Italian buffalo in Algeriian rural areas is fit for the best valorisation of natural wet and/or semi-wet environmental "biomes", as well as for many typical areas with "soft soil" of the Algerian environment.
- Origin and spread of the buffalo. The systematics of the buffalo species, starting from the Subfamily of "Bovidae" (which is also inclusive of Beef and Cows), refers to Gender "Bubalus" and Species "bubalis" (*Bubalus bubalis*).
  In Italy the original "buffalos" became extinct (the Roman historians do not mention it), and reappeared in the late sixth century, from Hungary and elsewhere, with the descent of the Lombards Agilulf. Currently the buffalo has spread to all continents (Europe, as well as Italy, are small farms in Greece). In Italy, the areas of greatest spread of buffalo is Campania (provinces of Caserta and Salerno) where I is concentrated 80% of the national heritage. The type of buffalo raised in Italy has characteristics of hardiness and productivity of all details, so it can be defined ITALIAN BUFFALO. The demand for buffalo milk for the production of cheese (mozzarella and smoked cheese) is on the rise and the buffalo milk is not subject to limitations or production quotas instead provided by the EC for bovine milk, whose production is surplus in the Community . The Italian Mediterranean buffalo is a breed of buffalo [called "Italian Mediterranean" officially recognized in Italy in 2000.
  The buffalo raised in Italy is of the River, formerly called "buffalo Mediterranean". The Italian Mediterranean race was defined thanks to the long isolation and the lack of intersections with buffaloes belonging to the same group or different groups of other nations of the world, which has allowed the formation of a race morphologically and functionally different.
  The breed is popular for the milk produced by buffaloes, which is used for the production of buffalo mozzarella and other cheeses such as cottage cheese, smoked cheese, soft cheese, burrata, Tomino, as well as yogurt, as well as for meat.

PROJECT SCHEDULE # 7

PROJECTS ►						7			
MINISTRIES									
ENVIRONMENT						PHYTO			

PROJECT PROPOSAL

7) **Phyto-depuration for the recovery of dirty waters from civil and industrial activities**

ACRONYM

7) **PHYTO**

PROJECT SCHEDULE - RESUME

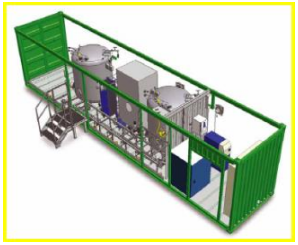
- The project proposal is dedicated to the implementation of modular (pilot) plants for the "phyto-depuration" of dirty water(s), including dirty water from sewer system of a small (rural) town, livestock sewage (e.g. pig sewage), agro-industrial dirty water(s), cheese factory's dirty water, slaughter-house's dirty water, etc..
- The action of the phyto-depuration systems allows a natural "bio-remediation" which supplies cleaned / bio-filtered water for irrigation from "dirty polluted water". This approach allows to cancel the usual spread of dirty water(s) into the natural environment, which causes permanent and dangerous pullution.
- A constructed phyto-depuration plant is an artificial natural habitat made of plants, bacteria and structured hydraulic tools for the treatment of wastewater for the mitigation and/or elimination of ecological disturbances for natural areas. The system refers to the natural wetlands act as a biofilter, removing sediments and pollutants such as heavy metals from the water, and constructed "phyto-depurators" can be designed to emulate these features using proper biotechnologies which are able to couple useful "absorbing / sucking plants" to "symbiont micro-organisms" (e.g. dedicated bacteria and mychorrizae) at the level of the rooting system of the plants.
- After phyto-depuration, discharged cleaned water(s) can be used for irrigation purposes. The plants set is usually made of genus *Phragmites* and *Typha: t*hese essences develop a rhizosphere on which, by microbial action (inoculated through the biotechnology of "mychorrizae & rhizo-bacteria symbiotic rhizosphere"), it allows the decomposition of organic matter, the oxidation of nitrogen and the absorption of many further metals and/or organic / inorganic pollutants.
- Biofiltration. This community of microorganisms is known as the periphyton. The periphyton and natural chemical processes are responsible for approximately 90 percent of pollutant removal and waste breakdown: then, the plants remove about seven to ten percent of residual pollutants, and act as a carbon source for the microbes when they decay.
- Constructed Subsurface-flow phyto-depurators. Subsurface-flow wetlands can be further classified as horizontal flow and vertical flow constructed wetlands. According to different pilot-areas, any single plants will be planned through a careful and dedicated customization of the available technologies.

PROJECT SCHEDULE # 8

PROJECTS ►							8		
MINISTRIES									
ENVIRONMENT							WASTE		

PROJECT PROPOSAL

8) Bio-gasoil production from urban waste organic fraction: the Bio Fuel Catalytic Cracking (BFCC) process.



ACRONYM

8) WASTE

THE GOALS OF THE PROJECT PROPOSAL

- The BFCC process allows to produce pure gasoil of international fuel grade from residual biomasses, such as the organic fraction of urban wastes, muds, cellulose, lignin (wooden residues), etc.. The project consists of a micro-pilot plant for demonstrative bio-cracking tests from territorial residual biomasses.

INDUSTRIAL PLANT DESCRIPTION

- The BFCC process is a continuous process where the solid organic feedstock is fed as a slurry by dispersion in an organic high boiling point liquid (generally a mineral or vegetable oil). The oil has several functions inside the plant: to facilitate the charge of the solid feedstock, to assure a intimate contact between the feedstock and the catalysts, to facilitate (accelerate) the heat transfer, to assure the reaching of homogeneous reaction conditions and to facilitate the transfer of the reaction products through the various sections of the plant.
- The technology consists of an improvement of the well known “Fast Pyrolysis Process”, described since last century in many scientific publications. BFCC applies the concepts already described in many University Reports to an industrial facility able to work in continuous and in heavy duty conditions.
- In the BFCC process the presence of a catalyst, associated to a system able to give energy to the reacting biomass in a very fast way, and under intense mixing conditions it creates the conditions for generating hydrogen atoms which react with the pyrolysis products. The result is an hydrogenation at a temperature below 320°C and at atmospheric pressure.
- It gives a great advantage compared to the current hydrogenation processes used for producing fuels oils, which require high pressures and temperature.

MASS AND ENERGY BALANCE

- Due to the fact that the biomass never contains 100% cellulose, and assuming a 90% reaction efficiency, the following yields can be hypothesized:
- Per 1 Kg of dry biomass:
  - ► 24 to 30% diesel fuel oil
  - ► 20 to 28 % water
  - ► 31 to 37% gaseous products (mainly CO^2 + light gases CO, CH^n)
  - ► 25% to 30 % solid residue (char)

PROJECT SCHEDULE # 9

PROJECTS ► / MINISTRIES							9		
ENERGY							HYDRO		

PROJECT PROPOSAL

9) Mini-Micro hydro-electric power units for rural renewable energy

ACRONYM

9) HYDRO

PROJECT SCHEDULE - RESUME

- The project proposal is referred to innovative **micro hydro-electric power units for rural, hilly and mountain areas of Albania**. Micro-hydro is a type of hydroelectric power that typically produce up to 100 kWe of electricity using the natural flow of water. These installations can provide power to an isolated home and/or small community, or are sometimes connected to electric power networks. There are many of these installations around the world, particularly in developing nations as they can provide an economical source of energy without the purchase of fuel, furthermore being a perfect “renewable source of green energy”. Micro hydro systems often complement photovoltaic solar energy systems because in many areas the water flow, and thus available hydro power, is highest in the winter when solar energy is at a minimum.
- Turbine types. Several different types of water turbines can be used in micro hydro installations, selection depending on the head of water, the volume of flow, and such factors as availability of local maintenance and transport of equipment to the site. In low-head installations, maintenance and mechanism costs often become important.
- A low-head system moves larger amounts of water, and is more likely to encounter surface debris. For this reason a Banki turbine also called Ossberger turbine, a pressurized self-cleaning crossflow waterwheel, is often preferred for low-head microhydropower systems. Though less efficient, its simpler structure is less expensive than other low-head turbines of the same capacity. Since the water flows in, then out of it, it cleans itself and is less prone to jam with debris.
    - Reverse Archimedes' screw: two low-head schemes in England, Settle Hydro and Torrs Hydro use an Archimedes' screw which is another debris-tolerant design. Efficiency 85%.
    - Gorlov: the Gorlov helical turbine free stream or constrained flow with or without a dam,
    - Francis and propeller turbines. Kaplan turbine : an alternative to the traditional kaplan turbine is a large diameter, slow turning, permanent magnet, sloped open flow VLH turbine with efficiencies of 90%. Water wheel : advanced hydraulic water wheels and hydraulic wheel-part reaction turbine can have hydraulic efficiencies of 67% and 85% respectively.
    - Gravitation water vortex power plant : part of the river flow at a weir or natural water fall is diverted into a round basin with a central bottom exit that creates a vortex. A simple rotor (and connected generator) is moved by the kinetic energy. Efficiencies of 83% down to 64% at 1/3 part flow.
- Potential for rural development
    - In relation to rural development, the simplicity and low relative cost of micro hydro systems open up new opportunities for some isolated communities in need of electricity. With only a small stream needed, remote areas can access lighting and communications for homes, medical clinics, schools, and other facilities.
    - Micro-hydro can even run a certain level of machinery supporting small businesses. Regions along the Andes mountains and in Sri Lanka and China already have similar, active programs.
    - One seemingly unexpected use of such systems in some areas is to keep young community members from moving into more urban regions in order to spur economic growth.
    - Also, as the possibility of financial incentives for less carbon intensive processes grows, the future of micro-hydro systems may become more appealing.

PROJECT SCHEDULE # 10

PROJECTS ►								10	
MINISTRY									
ECONOMICAL DEVELOPMENT								DRON	

PROJECT PROPOSAL

10) Flying Automatic Drones for territorial monitoring

ACRONYM

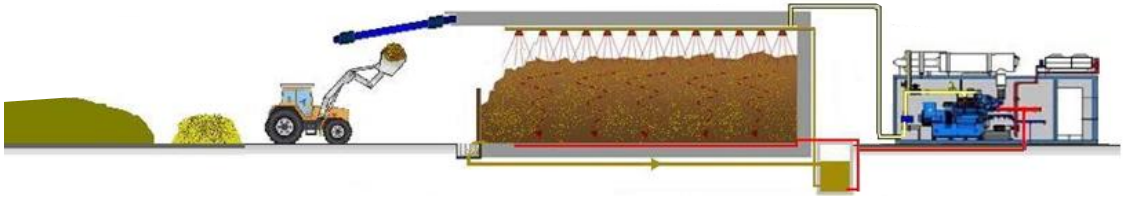
10) DRON

PROJECT SCHEDULE - RESUME

- The AGRO-DRONES by UAV (Unmanned Aerial Vehicles Pilot-less Aviation) consists of a new territorial management concept based on observing the territory from aerial view by UAV, measuring and responding to inter and intra-field variability in agriculture, forestry, ecology.
- Precision agriculture and forestry management aims to optimize field-level & forestry management with regard to:
  - agricultural & forestry science: by matching farming practices more closely to their needs (e.g. fertilizer inputs);
  - environmental protection: by reducing environmental risks and footprint of farming & new forestry (e.g. limiting nitrogen's leaching);
  - economics: by boosting competitiveness through more efficient practices (e.g. improved management of fertilizer usage and other inputs).
- Precision agriculture & forestry also provides farmers with a wealth of information to:
  - build up a record of their farm;
  - improve decision-making;
  - faster greater traceability;
  - enhance marketing of farm products;
  - improve lease arrangements and relationship with landlords;
  - enhance the inherent quality of farm products.
- The use of UAV allows to better ananyze any plot: less time, less costs, better precision than any traditional methodology.
- One of these methodologies is NDV, the Normalized Difference Vegetation Index. It is a simple graphical indicator which can be used to analyze remote sensing measurements, now perfomed by UAV, assessing «if and how much» the target under observation is made of living (green) or sick or dead vegetation, as well as it allows to monitor many further important parameters.
- NDVI can also describe the vegetation density, allowing the farmers to evaluate plant germination, growth and productivity. The index is calculated as the reflection difference in the near-infrared and red spectrum divided by its total. As a result the NDVI values range from -1 to 1. For the green vegetation the red spectrum reflection is always lower than in the near-infrared due to light absorption by chlorophyll. Therefore NDVI values for the vegetation can not be lower than 0.

PROJECT SCHEDULE # 11

PROJECTS ►									11
MINISTRIES									
ENERGY									BGAS



PROJECT PROPOSAL

11) Biogas containerized micro-factory units for residual biomasses

ACRONYM

11) BGAS

PROJECT SCHEDULE - RESUME

- The project proposal is dedicated to the implementation in Algerian rural areas of modular containerized small (pilot) plants for anaerobic digestion of residual biomasses: sludges, organic fraction of urban waste, residues form slaughter houses, residues from cheese factories, no-food crops (silage), phyto-depurative plants (biomass from aerial vegetation), etc..
- Anaerobic digestion is a collection of processes by which the microorganisms (taken from the natural rumen of milk cows) break down biodegradable material in the absence of oxygen. The process is used for agro-industrial and/or domestic purposes to manage waste and/or to produce fuels. Anaerobic digestion occurs naturally in some soils and in lake and oceanic basin sediments.
- The digestion process begins with bacterial hydrolysis of the input materials. Insoluble organic polymers, such as carbohydrates, are broken down to soluble derivatives that become available for other bacteria. Acidogenic bacteria then convert the sugars and amino acids into carbon dioxide, hydrogen, ammonia, and organic acids. These bacteria convert these resulting organic acids into acetic acid, along with additional ammonia, hydrogen, and carbon dioxide. Finally, methanogens convert these products to methane and carbon dioxide.
- As part of an integrated waste management system, anaerobic digestion reduces the emission of landfill gas into the atmosphere. Anaerobic digesters can also be fed with purpose-grown energy crops, such as maize, sorghum, giant reed (*Arundo donax*), etc..
- Anaerobic digestion is widely used as a source of renewable energy. The process produces a biogas, consisting of methane, carbon dioxide and traces of other gases. This biogas can be used directly as fuel, in *combined heat and power gas engines* or upgraded to natural gas-quality biomethane. The nutrient-rich digestate also produced is used as organic fertilizer with high performances for soils' fertility improvement.
- The present project proposal supplies innovative biodigester units composed by micro-plants, each one containerized in 40-feet containers purposely equipped for batch-cycles of anaerobic biodigestion. The co-generating units fed with the biogas produce either electric energy or thermal energy for any use.

CHAPTER 3

TTT Training Programme
Train the Trainers & the Trainees
Training Programme for the sustainable rural development of Algeria

✓ THE ACADEMIC SUPPORT FOR THE TRAINING & KNOW-HOW TRANSFER FOR THE ITALO-ALGERIAN PROJECTS

CV COMPACT RESUME

Prof. Dr. ALESSANDRO ARIOLI, PhD, Agronomist - Born in Milan (Italy)

Phone +39 3668627554 E-mail : istariol.mail@gmail.com Skype: alessandro.arioli2

CONSULTANT

Formal Qualifications

Main Areas of Competence

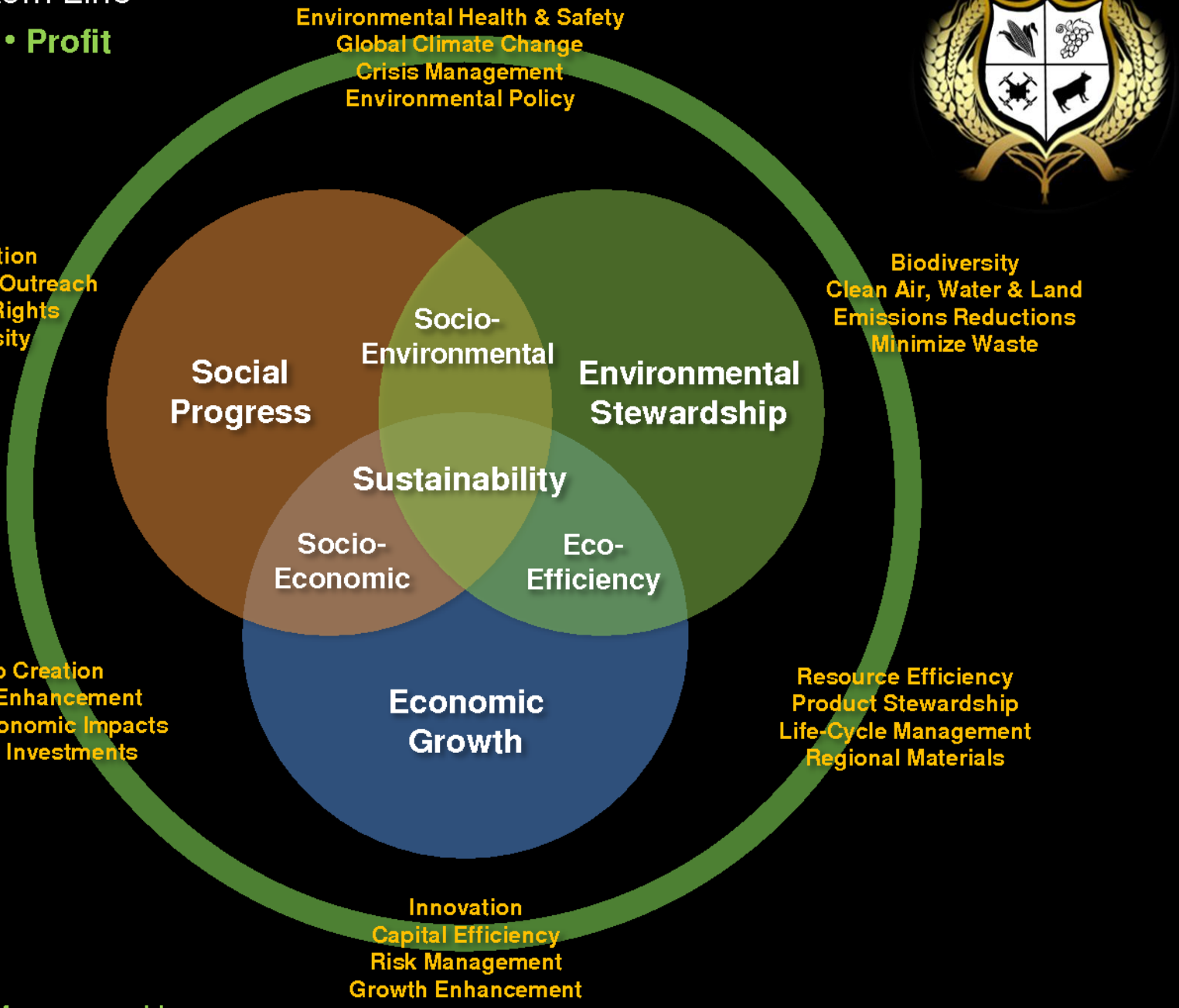
Min Experiences and Assignments

- Professor in Agricultural, Food, Energy, Ecology, Environment, Green Economy, Quality Assessment Sciences.
- Official Assessor @ Court of Justice of Turin (Italy).
- Delegate of Italy @ EU Commissions, Rapporteur for VII Framework and Horizon-2020 R&D Programmes.
- CEO and Chair of the International University Department of Agricultural, Food, Energy and Environmental Sciences (D.A.F.E.E.S. Department, Turin, Italy).
  In-house Department @ S.E.V.S. / U.C.E.U. University (University of Central Europe – Skalica, Slovak Republic).
- CEO and Chair of Istituto Ricerca Dr. Arioli S.a.s. (Research Institute Dr. Arioli S.a.s.), Turin (Italy).
- Former Professor in agricultural technologies, quality assessment and biomasses @ University of Turin (Italy).
- Former Professor in innovative technologies for biomasses @ University of Eastern Piedmont (Alessandria, Italy).
- Member of the Board of Directors @ S.E.V.S. / U.C.E.U. University (University of Central Europe – Skalica, Slovak Republic)..

Updated September 2013.

The Triple Bottom Line

People • Planet • Profit



*TBL diagram adapted from www.gcbl.org

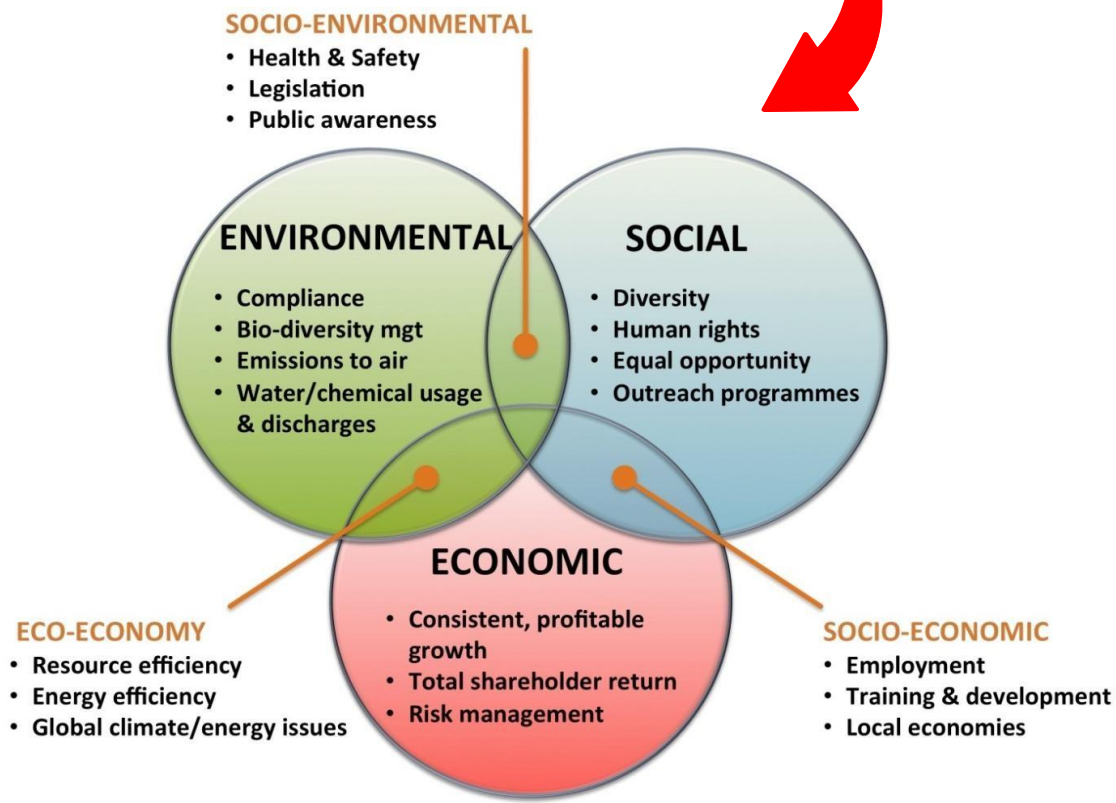
In terms of coherence with the worldwide trend of demography and natural resources' consumption, the risk of a non-sustainable development would affect the survival of our planet and of the mankind as a whole, if these nations will misleadingly identify profit with the logic of optimization of profit that has brought the world to the brim of global scarcity of food, feed, water, biodiversity's guardianship and renewable energy ("food, feed, water, biodiversity and energy security global issues").

PEOPLE, PLANET AND PROFIT

If our planet is to have a future, it will be in the framing of appropriate models of sustainable production and consumption. D.A.F.E.E.S. Department has started various University-wide projects regarding these research areas, including a broad range of curricular and extra-curricular opportunities to work in the fields of sustainability and environmental studies.

In the future, already starting with the present, we believe that many career and business opportunities will be connected to sustainable development. Policymakers, managers, politicians and businessmen will have to face environmental issues.

WHAT ABOUT OUR ETHIC GUIDELINES?



WHO AND HOW WE ARE?

PROF. ALESSANDRO ARIOLI , PhD
Chair of the Private Department of Agricultural, Food, Energy and Environmental Sciences - DAFEES

The Department of Agricultural, Food, Energy and Environmental Sciences (D.A.F.E.E.S.) is a private School of International University Studies, Research and Development dedicated to the Sustainable Development, following the paradigm of «The GloCal and Holistic Approach».

In terms of background, D.A.F.E.E.S. Department established in 1996 became a permanent branch of Istituto di ricerca di Dott. Arioli e C. S.a.s., an Italian research company with more than 20 years of experience in agro-food production, environmental care, R&D in agricultural and renewable energy sectors in European, African and Asian Countries. The company (Istituto di ricerca di Dott. Arioli e C. S.a.s.) is managed by its Founder and CEO, Prof. Alessandro Arioli, agronomist and EU consultant and reviewer.

The academic Institution (D.A.F.E.E.S.) is dedicated to the study and guardianship of the environment. Its mission is to promote a sustainable culture by emphasizing that sustainability is either a moral imperative or a profitable field of activity. Every course, research initiative and/or scholarly symposia approaches this objective through the specific lens provided by the disciplines.

“Sustainable Development” is the cornerstone of our University’s environmental mission. We firmly believe that we need to provide a future to “developed” and “developing” Countries with positive models that do not hinder opportunities for collective survival.

However, D.A.F.E.E.S. believes that “developing Countries” should not be asked to suffer the economic and developmental losses that the developed western world is not willing to endure.

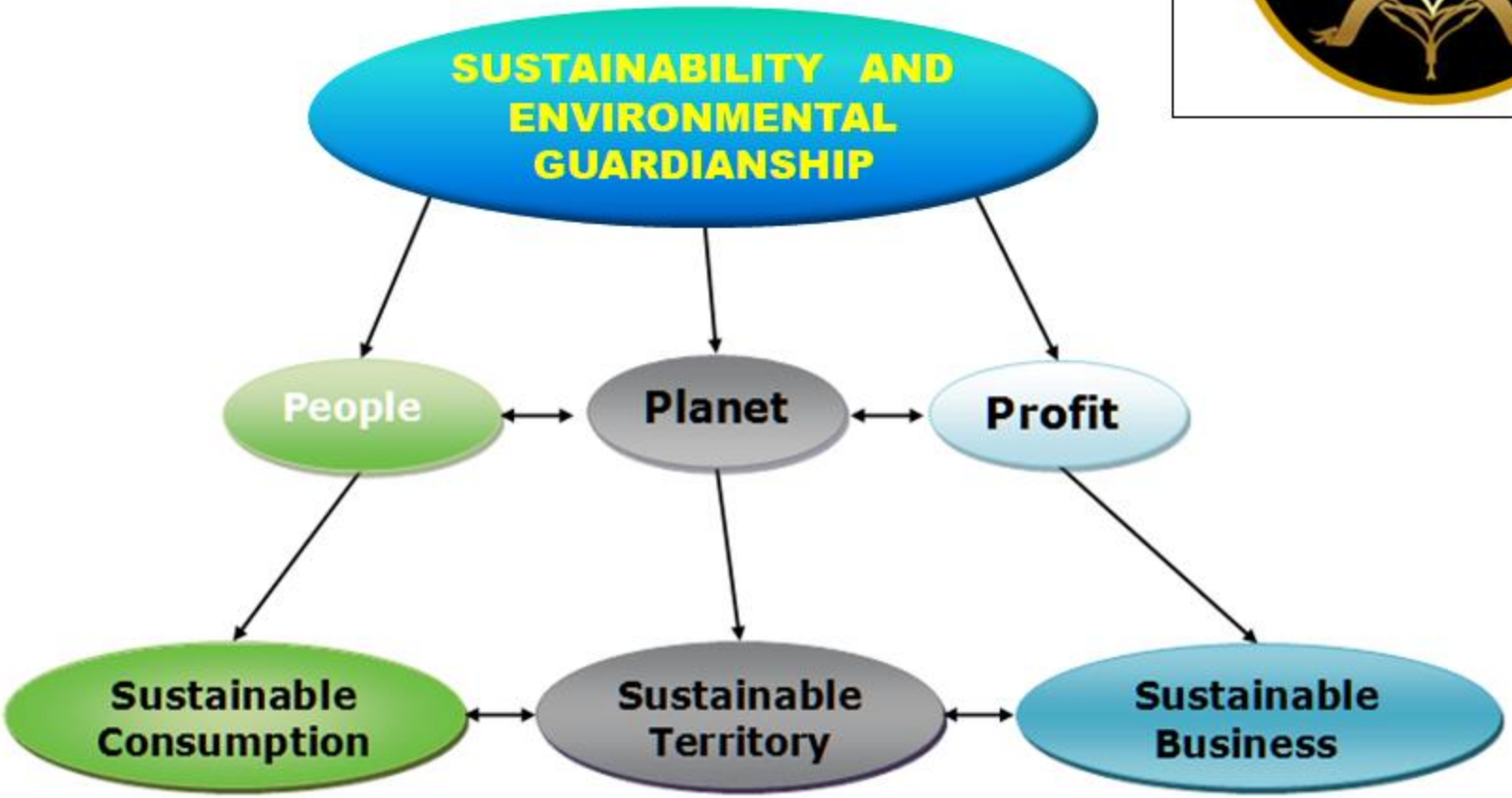
Only by promoting the knowledge that “sustainability” is economically and morally profitable we can hope to avert a catastrophe on a planetary scale concerning insufficient availability of food, feed, water, biodiversity, energy, resilience and glocal approach.

PEOPLE, PLANET AND PROFIT

DEPARTMENT
OF AGRICULTURAL FOOD, ENERGY, ENVIRONMENTAL AND SOCIAL SCIENCES
D.A.F.E.E.S.

If our planet is to have a future, it will be in the framing of appropriate models of sustainable production and consumption.

We started various University-wide projects regarding these research areas, including a broad range of curricular and extra-curricular opportunities to work in the fields of sustainability and environmental studies.



Department of ENVIRONMENTAL and SOCIAL SCIENCES

The *Organization for Economic Co-operation and Development* – OECD recently and clearly stated that in the period 2010-2050 the 80% of new workplaces worldwide will be created by the so called "Green Economy". All the macro-indicators show that there is not a credible alternative to the implementation of an international action for the definitive and non-returnable achievement of the "environmental booster" as the main tool of sustainable development.

The need of new technicians in "environmental applicable sciences" today and in the near future is impressive: any traditional "science" applied to "the territory" (biology, agronomy, zootechny, geology, engineering, renewable energy, etc.) needs to be revisited and synergistically hybridized with the "environmental science", in the aim of creating a new "holistic approach" to Green Economy.

D.A.F.E.E.S. Department dedicates most of its instruction to the study of how humans assimilate with their environment.

D.A.F.E.E.S. offers an academic program that addresses environmental issues with an educational program that increases cultural understanding and awareness. Each program considers the ecosystem to be strongly connected to our culture and human artistic, economic and historical activities.

DEPARTMENT
OF AGRICULTURAL FOOD, ENERGY, ENVIRONMENTAL AND SOCIAL SCIENCES
D.A.F.E.E.S.

DEPARTMENT
OF AGRICULTURAL FOOD, ENERGY, ENVIRONMENTAL AND SOCIAL SCIENCES
D.A.F.E.E.S.

UNIVERSITY ACADEMY & DIPLOMAS

- CERTIFICATES
- BACHELORS
- MASTERS
- PhD DOCTORATES
- FACULTY LEDS
- INTERNSHIPS
- WORKSHOPS

HOLISTIC INTEGRATION

- INTELLECTUAL PROPERTY & INTANGIBLE ASSETS MANAGEMENT
- ECO-BUILDING & BIO-BUILDING PLANNING & CONSTRUCTION
- TANNERY & LEATHER SUPPLY-CHAIN
- SUSTAINABLE AGRICULTURE (VILLAGE PROJECTS)
- PHYTO-DEPURATION (BLACK WATER TREATMENT)
- WATER CONSERVATION
- HEALTH & CARE
- WATER PURIFYING & DESALINATION
- RENEWABLE ENERGIES PLANNING & CONSTRUCTION
- WELLNESS & FITNESS
- WASTE RECYCLING
- BIODIVERSITY GUARDIANSHIP
- NANO-TECHNOLOGIES
- QUALITY ASSESSMENT & CERTIFICATION
- GREEN ECONOMY
- FOOD MANAGEMENT & COOKING ARTS

ADVANCED I.C.T.

- REMOTE TEACHING (E-LEARNING)
- CYBER SECURITY
- DRONE ASSISTED TECHNOLOGIES
- ARTIFICIAL INTELLIGENCE
- TELE-MEDICINE
- BLOCKCHAINS & CRYPTO-CURRENCIES

DEPARTMENT OF AGRICULTURAL, FOOD, ENERGY ENVIRONMENTAL AND SOCIAL SCIENCES

The 3 levels of Department's teaching activities

BACHELOR 4 years

MASTER 2 years

PhD DOCTORATE 2-3 years

DIPLOMA ▼

GRADUATED TECHNICIAN

- TERRITORIAL PLANNING
- TERRITORIAL TECHNICAL ASSISTANCE

CERTIFICATE 1 SEMESTER

SPECIALIZED TRAINER

- TERRITORIAL TUTORSHIP
- TERRITORIAL ASSESSMENT

- Faculty Leds (1-3 weeks)
- Internships (2-8 weeks)
- Workshops (1-5 days)

- QUALIFIED TRAINEES (FARMERS, BREEDERS, TECHNICAL OPERATORS, STUDENTS)

- SUSTAINABLE PRACTICE

Istituto di Ricerca
di Dr. Arioli e C. S.a.s.

AgroVeritas Consortium

Largo Vittorio Emanuele II n. 82 - Turin - Italy Phone +39 0115613075

Alessandro ARIOLI *e-mail:* istariol@tin.it *or* a.arioli@sjiu.it
Maurizio DE VITO *e-mail:* maurizio.devito@dp-group.org