



LEARNING AREA « DALMATIAN ISLANDS » (Croatia)

A BASELINE ASSESSMENT

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Learning area of Dalmatian islands



A portrait of the Dalmatian islands Learning Area (LA)

The learning area of Dalmatian islands covers the territory of three local action groups LAG Škoji, LAG Brač and LAG 5 situated in central and south Dalmatia in the Split-Dalmatia and Dubrovnik-Neretva region. Specifically islands of Brač, Hvar, Šolta, Vis, Mljet, Lastovo, Korčula, Pelješac peninsula and the Dubrovnik West Coast municipality. More than 80% of the area is Natura 2000 sites, encompassing one National Park "Mljet and Nature park "Lastovo islands" as well as many nature protected landscapes. The area is highly touristic due to its natural and cultural heritage.

This territory (185 824 ha) is characterised with a predominant HNV type 2, which consists of a mosaic of low intensity farming namely composed of small fields of arable plots, vegetable gardens, orchards and vineyards, usually on stone wall (AgroParistech, 2017:13). Therefore the whole description of the LA we here provide, is structured around the mosaic agricultural landscape that despite the fact that today it represents only 5,75% of the officially cultivated agricultural land, it has a significantly higher importance in terms of biodiversity, preservation of natural habitats and long term sustainable tourism activity as the major economic activity of the entire LA.

Photo credit:

Selca, Brač (source: Jakšić, K.)

Limits and key characteristics

Total surface: 1.858,24 km² (3,28% RH)

Inhabitants: 57.566 in 2011 (1,34% RH)

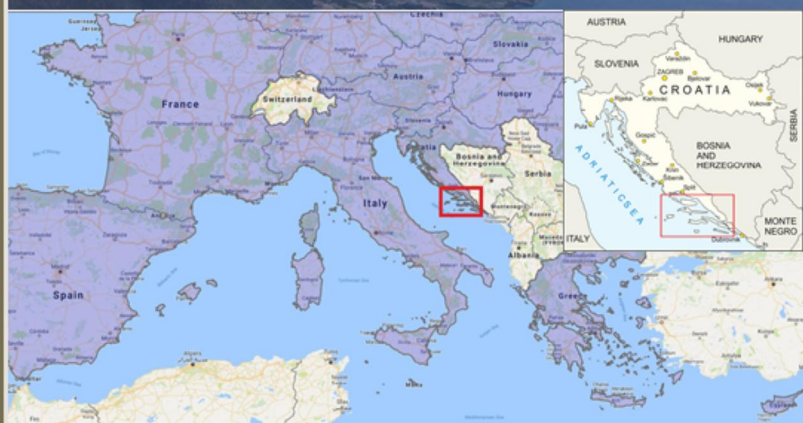
Population density: 30,98 inh./km² (RH: 75,71 inh./km²)

More than half of the area is a Natura 2000 site

27 local governmental units among which Supetar, Vis, Komiža, Stari Grad, Hvar and Korčula have status of town

Common characteristics of the area:

- *islands* (and one peninsula)
- *isolation* (difficult access)
 - *karstic area*
 - *lack of water*



Limits and the key characteristics of the LA "Dalmatian islands"

The LA "Dalmatian islands" is formally encompassed by official borders of 27 local governmental units (LGUs). 15 LGUs are belonging to Split-Dalmatia County while remaining 11 LGUs belong to Dubrovnik-Neretva County. In the LA there is a total of 57 566 inhabitants and the population density is 31 inh./km² that is well below the national average that is 76 inh./km². The average size of a parcel is 0,27 ha and there are more than 6 295 small scale family farms in the area. The area is characterised by a continuously decreasing population, small-scale agriculture and on some islands micro and on some islands small-extensive livestock farming.

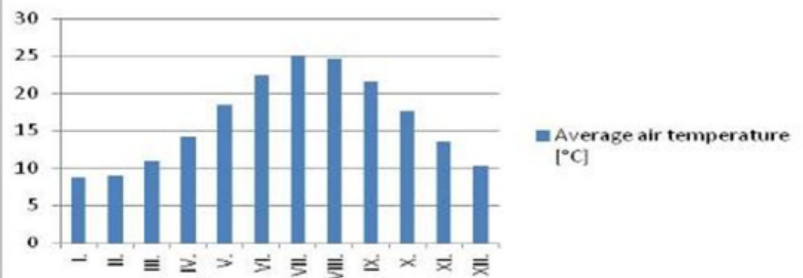
The diverse landscape is composed of different types of land cover that are quite differently spatially organized. The majority of the islands is covered in guarrigues, macchias and *Pinus halepensis*. Agricultural landscapes differ from island to island with the overall typology being internal and coastal hills, coastal slopes and karstic plains. The HNV type 2 to in the LA is seen through the presence of semi-natural vegetation and understorey, the land use and farming practices that foster biodiversity, and the presence of a landscape mosaic at a broader scale (Abdessater, 2017:50). The landscape is defined by its components and their position in relation to the landscape (ager: cropped land; sylva: woodland; hortus: gardenized land; saltus: uncultivated land) that are elements characteristic in all of the learning area islands. Its specificities on the scale of the island are seen in the distribution of agricultural practices where some of the island have predominant olive groves semi-natural habitats, some vineyards, some small scale livestock (Beug, 1967; Krklec et al, 2011).

Climate and Vegetation

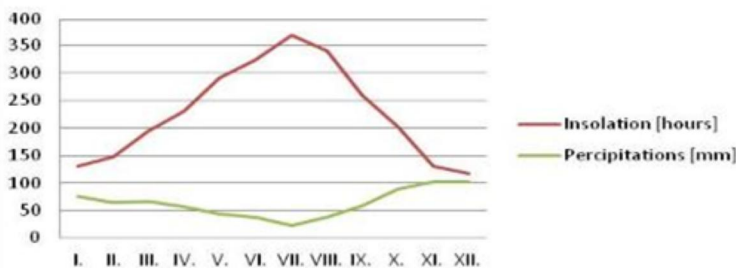
- **Mediterranean climate:**

- dry summers and mild rainy winters;
- Insolation: more than 2500 sunny days per year; temperatures rarely fall below zero

Average air temperature [°C] in town of Hvar



Average insolation and percipitation in town of Hvar



The LA area according to the Koppen climatic classification belongs to several basic types of the Mediterranean climate. Open islands such as the archipelagos of the island of Vis and Lastovo and the southernmost part of Korčula belong to the semi arid or "olive" climate covers that are characterised by pronounced heat and dryness, while precipitation comes only in the coldest parts of the year. True Mediterranean climate is one the nearer islands and the Pelješac peninsula. It is similar to the semi arid but has much more rainfall (Ozimec et al, 2015:33). In line with climate conditions, dominant agriculture consists of citrus fruits, olive trees and vineyards.

Vegetation layers



cro. makija (fr. maqui)



Immortelle (an aromatic plant)



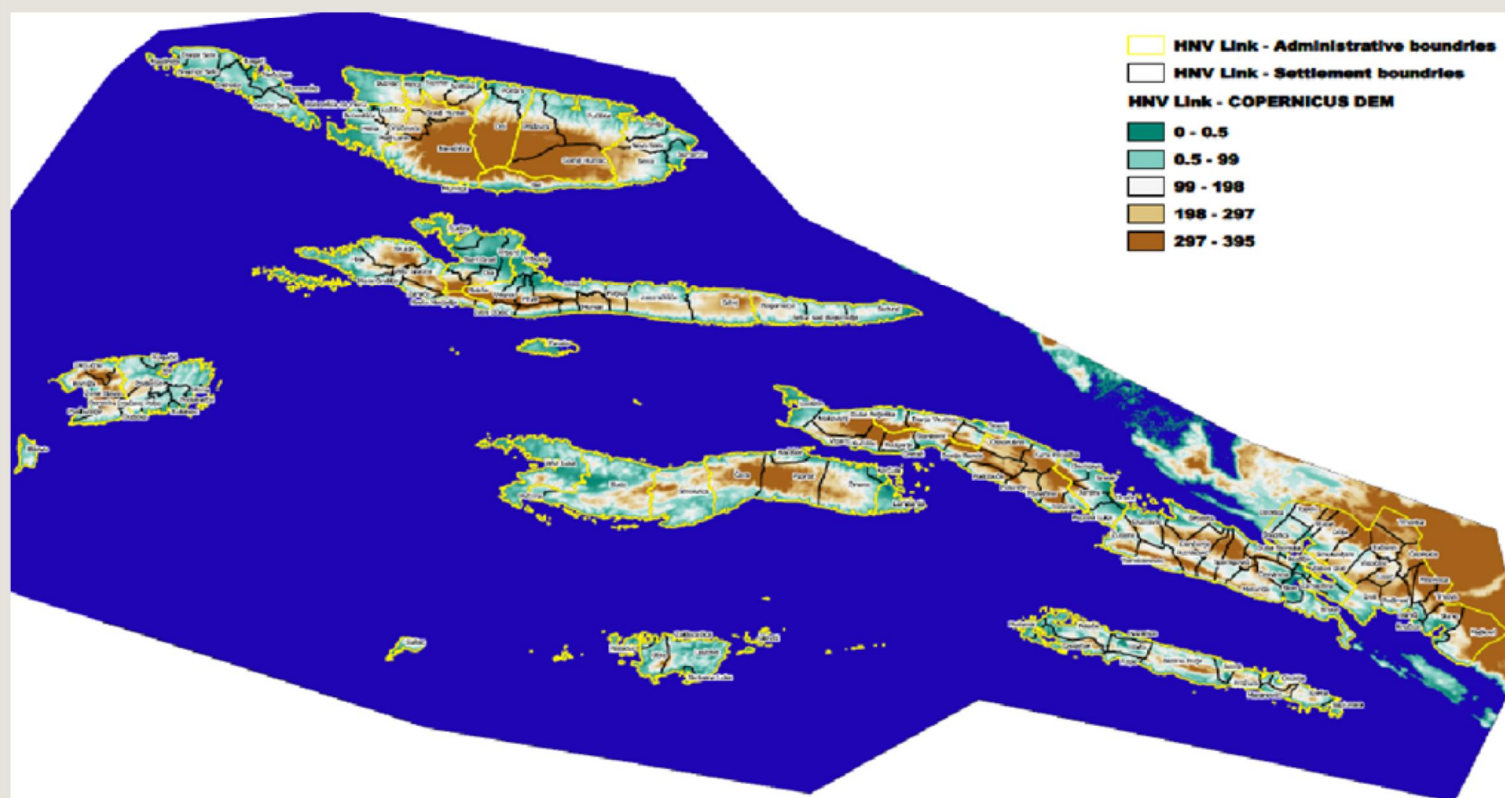
Pinus halepensis (back) and xerophyte vegetation in front (Brač)

Three types of vegetation (Defilippis, 1997:28):

- Ø "makija" – impassable dense holm communities
- Ø garigue – evergreen shrubs, low trees, aromatic herbs, and bunchgrasses found in poor or dry soil
- Ø *Pinus halepensis*

Until deagrarisation of these areas in 50-ies, impact of man on pasture and forest area was very significant. Wood was the only energy source. It was used for heating, cooking, and for construction. Huge amounts of wood area used in production of lime (high temperatures). Wood is cut to feed animals, and goats eat small trees preventing their growth. Energy and construction substitutes, as well as deagrarisation, led to autochthon forest regeneration (Defilippis, 1997).


LA Dalmatian Islands relief




Natural and semi natural habitats



Central plateau vineyards




Coastal landscape with vineyards




Dry stonewalls with olives, Lovište, Pelješac



Dry stonewalls with olives



Pastoralism



Figs, island Brač

Three types of landscapes can be found in the Dalmatian Islands:

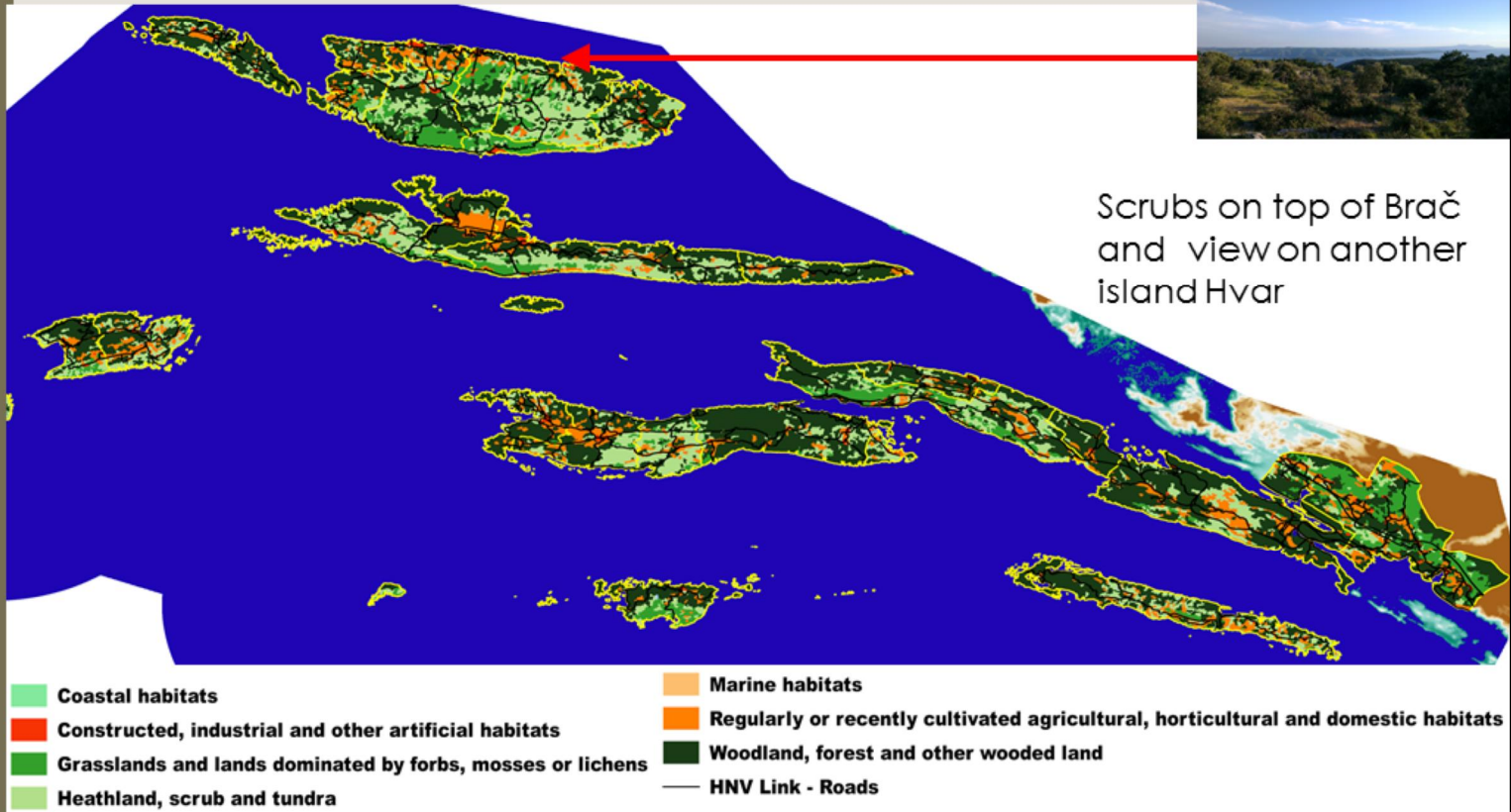
- a) karstic fields (flooded due to eroded surrounding hills)
- b) terraces on slopes (typical man-made landscape; erosion prevention measure which was a result of the labour surplus and cultivable land shortage)
- c) karstic pastures (extensive pasture; scarce xerophyte vegetation)

Due to the shortage of natural arable land in this karstic area, very sensitive landscape in Dalmatian Islands is a result of a longlasting efforts to create additional arable land and prevent erosion by cleaning stones and building stonewalls.

Erosion prevention is very important aspect of water management in a karstic area. It is necessary to apply measures which will prevent soil erosion from the bare, stony slopes and its relocation to the karstic fields. If slopes are covered with vegetation, water drains capillary and gradually. In this way floods in karstic fields and further slope erosion are avoided, and soil and vegetation on slopes are preserved.

Credit photos: LAG 5 and AgroParisTech

Main types of habitats

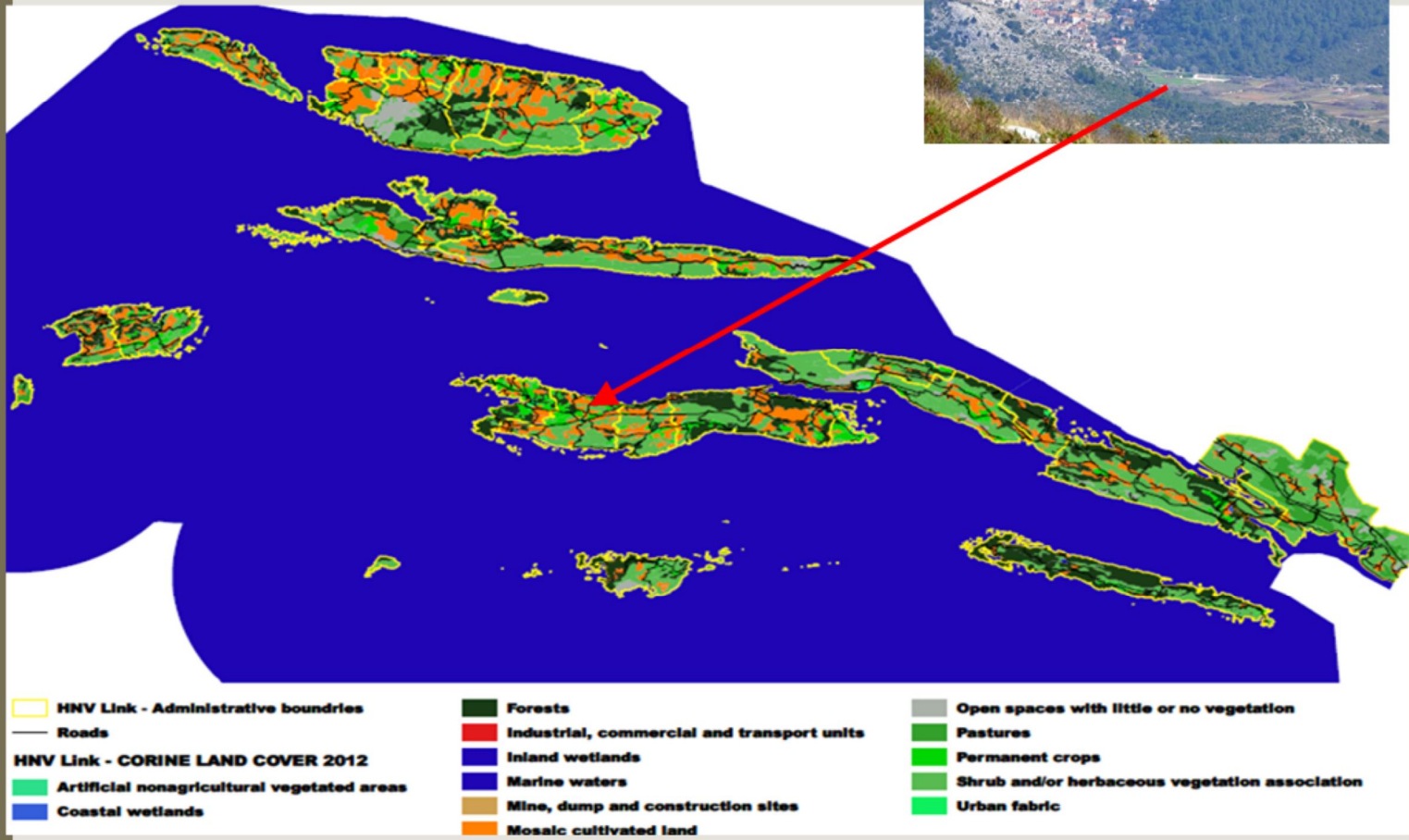


There are four main types of habitats:

- a) Grassland
- b) Scrubs
- c) Woodland
- d) Cultivated land

Main types of land use

(Data source: Corine land cover 2012)



There is a significant presence mosaic cultivated land.

Photo credit: Marija Roglić (LAG 5)

Landscapes and transects

- three zones: coastline, mountain part, central plateau
- traditional settlements are usually situated in the bottom, between field and hill
- spontaneous tourism development led to overurbanisation along the coast



Punat in Korčula.

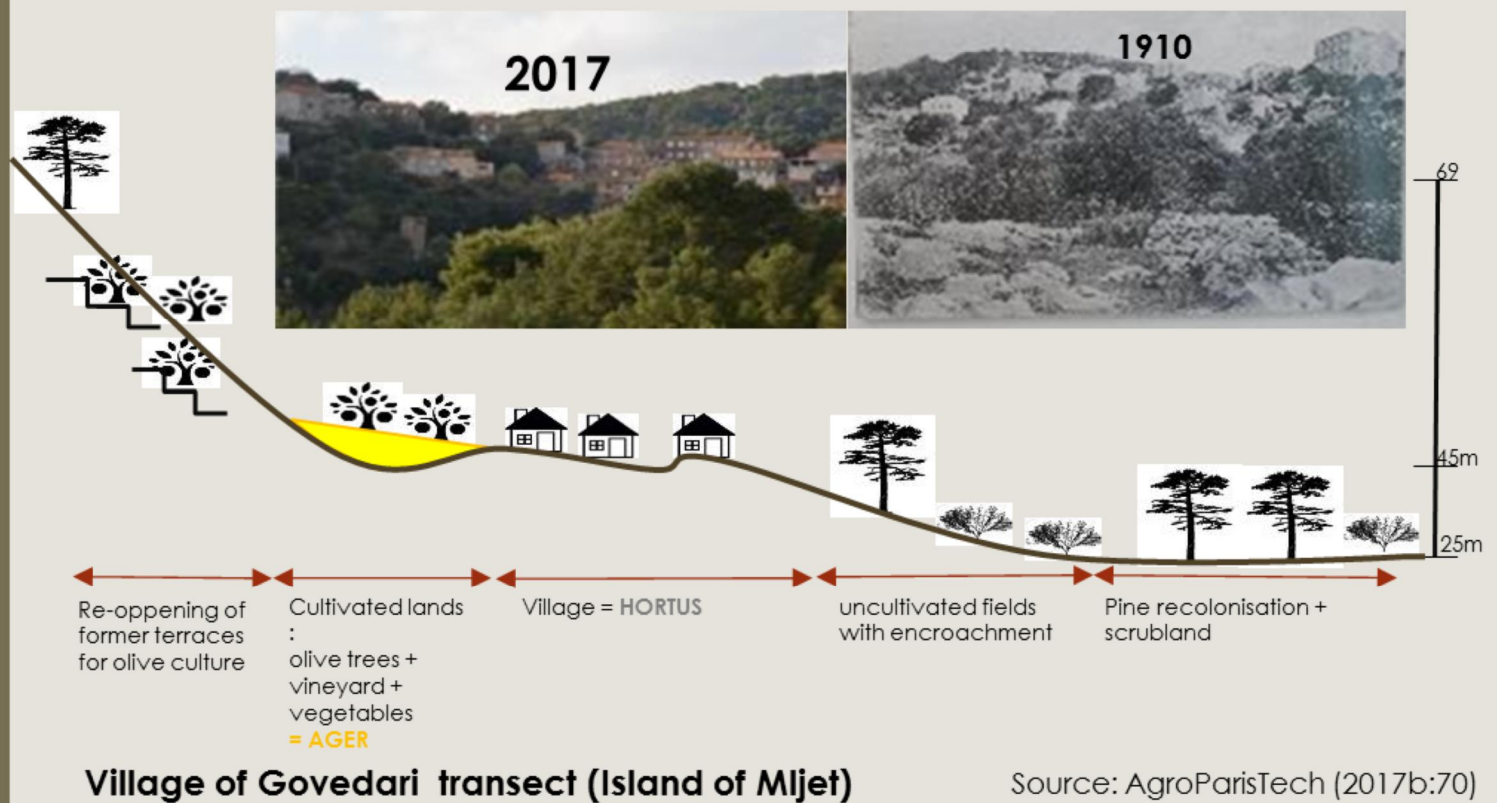
Source: Antić-Brautović et al, 2008:244



Coastal settlement Supetar (Brač),

Source: LAG5, 2017

HNV agrarian systems I: inland agriculture on slopes



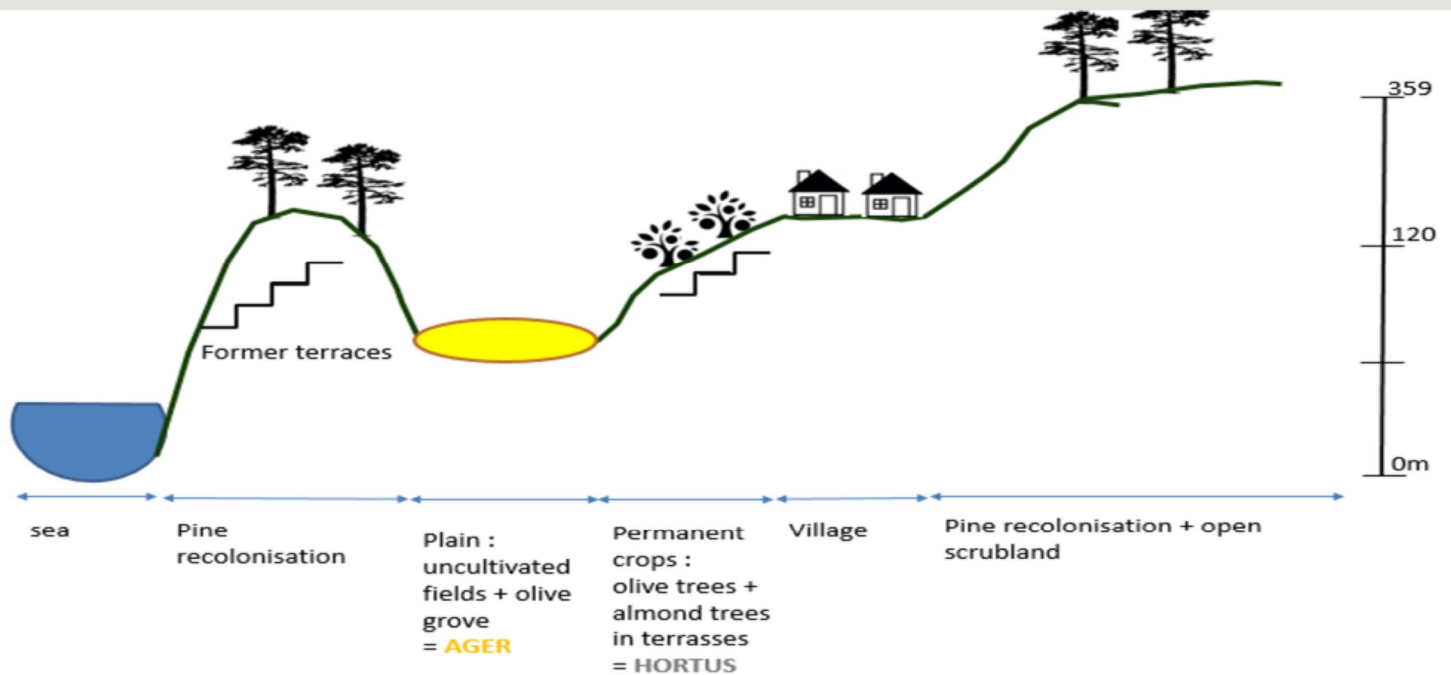
The HNV farming systems in the LA Dalmatian islands are linked to the adaptation of the agricultural practices to the landscape. Based on the geomorphology and agricultural activities in the islands the HNV farming consists mostly of a mosaic of low intensity farming mainly composed of small fields of arable plots, vegetable gardens, olive groves, orchards and vineyards, usually on terraces or surrounded by stone walls (Abdessater et al, 2017:49). Orchards and olive groves with large, old trees and a semi-permanent understorey are characteristic HNV type 2 in the LA.

The coastal villages are organized as "huerats" with ager that is characterised with a highly diverse small scale agriculture (Abdessater, 2017:111).

Photo credit:

Govedari (Mljet), postcard used in 1910, collection of Krunoslav Leko, source: Goleš, 2014

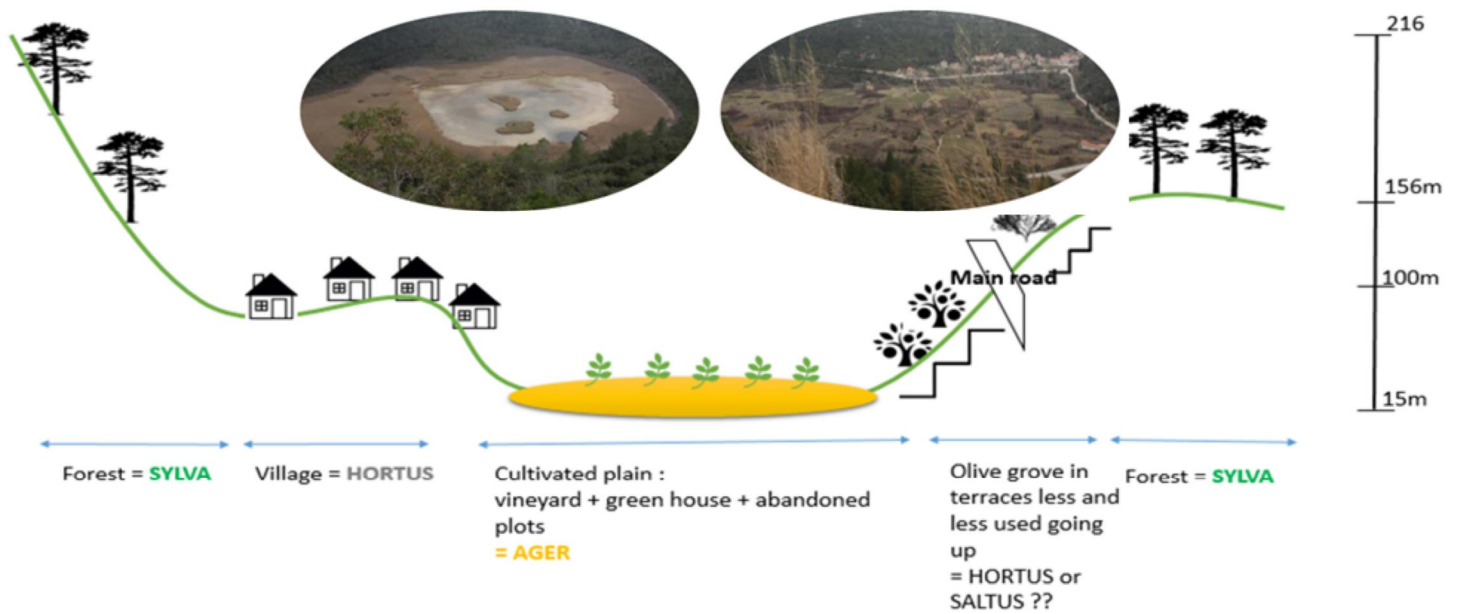
HNV agrariran system II: costal-inland agriculture on slopes



Village of Maranovići transect (island of Mljet)

Source: AgroParisTech (2017b:68)

HNV agrarian systems III: inland agriculture in ager



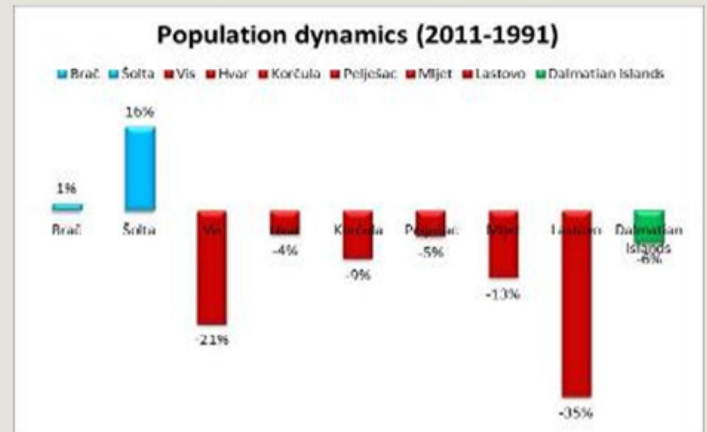
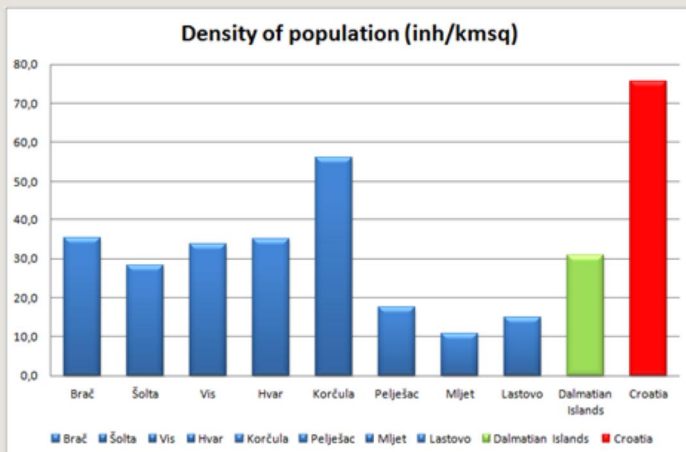
Village of Blato transect (Island Korčula)

Source: AgroParisTech (2017b:70)

Human geography: Population

Polupulation density in LA Dalmatian Islands is almost 2,5 times lower than the national average due to long-lasting depopulation process. Root causes are isolation and limited resources.

LA Dalmatian Islands is mostly rural area where only 35% of population lives in towns. The closest large urban areas are continent coastal cities Split and Dubrovnik.



Population on islands decreased by 6% from 1991 to 2011.

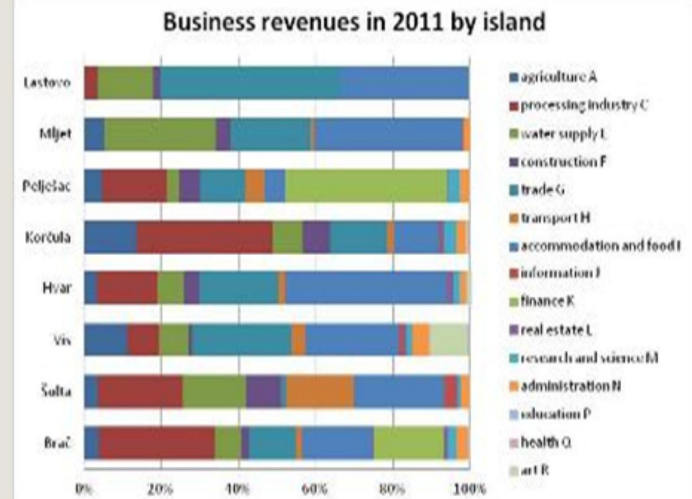
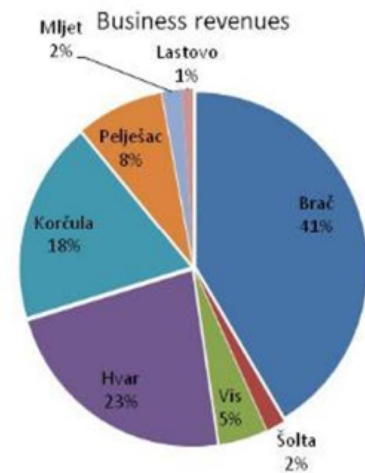
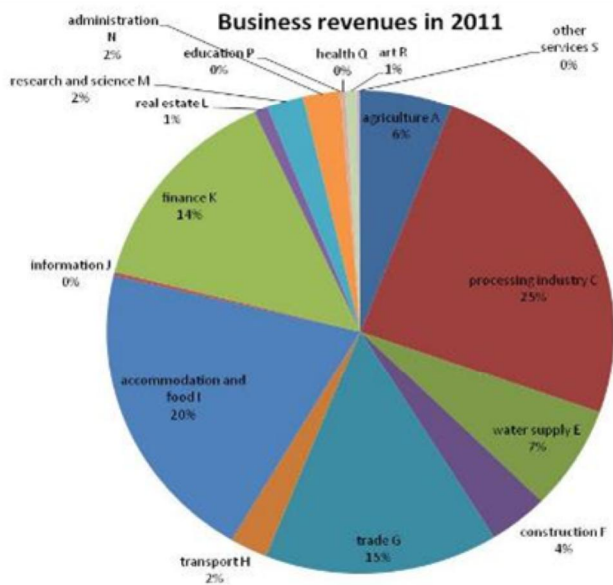
The highest number of people has been identified at the beginning of 20 century (high fertility rates has been overcoming long-lasting depopulation process that has been started in 19 century till 1921). Number of inhabitants decreased from 87.839 in 1921 to 57.566 in 2011 (by 34, 47%).

Several municipalities had some legal characteristics of towns (e.g. Korčula). Since municipalities have more people employed in public services with lower risk of losing their job they are demographically more resilience than villages.

The lowest depopulation has been detected in the towns on the coast with the tourism as a dominant sector.

Human geography: Business revenues

Total business revenue of the LA Dalmatian Islands in 2011 is 294 million euros (source: FINA*).



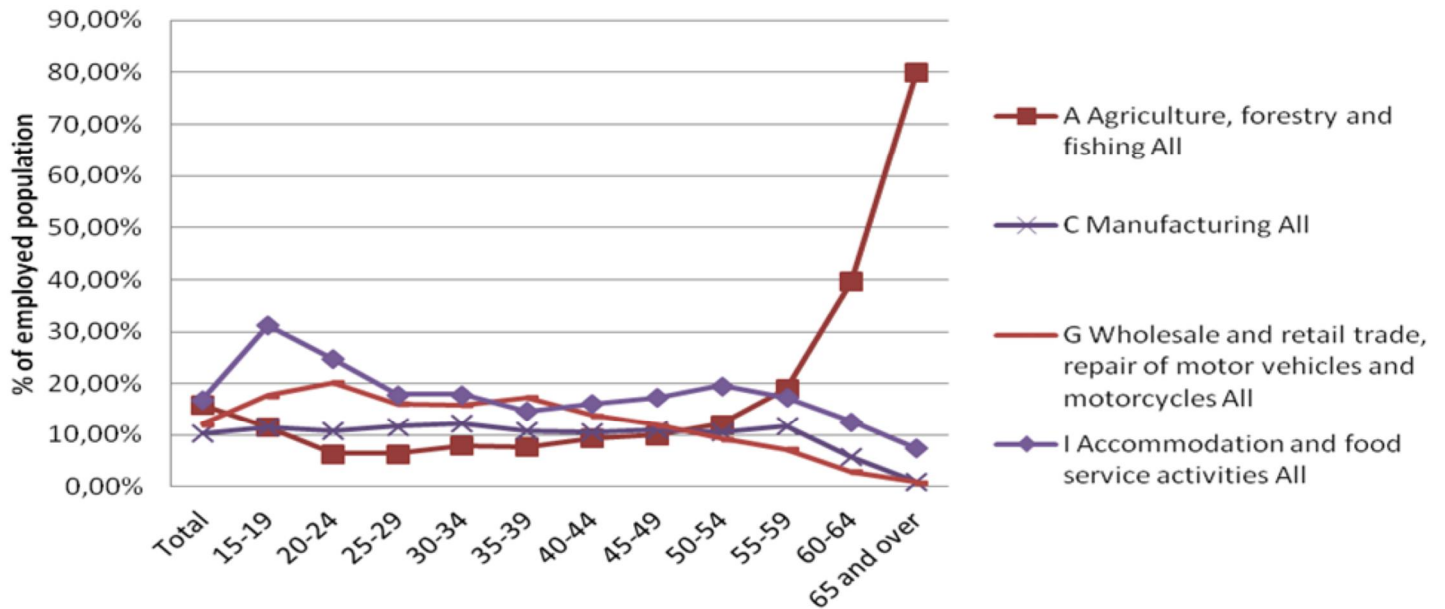
The economy of LA Dalmatian islands has been defined by natural environment and therefore its structure was very simple with large number of areas of economic activity missing or weakly present (islands were highly depended on agriculture production) (Defilippis, 1997).

The largest share of revenues belongs to business entities (which do not include crafts and family farms) is realised in service economy (accommodation, food, trade, transport and finance). Processing industry plays very important role on Korčula and Brač.

*FINA collects data from the business legal entities such as companies. This dataset does not include business data about family farm, public entities, crafts or NGO-s. Later in the presentation it is mentioned that family farms are the main organisational units in agriculture. Thus, business data from FINA does not capture agricultural activities adequately.

Employment: Age structure imbalances

Employment by age in dominant sectors in 2011

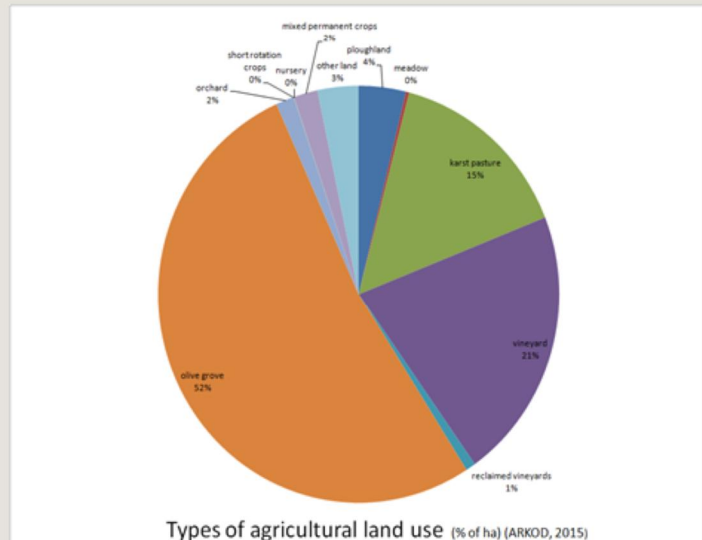
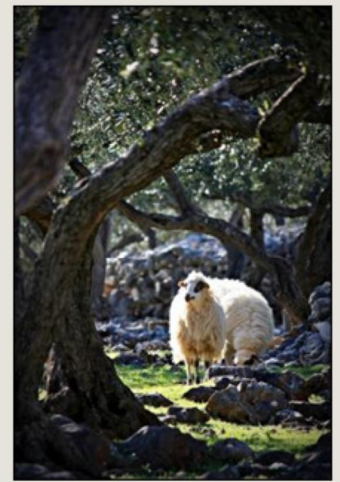
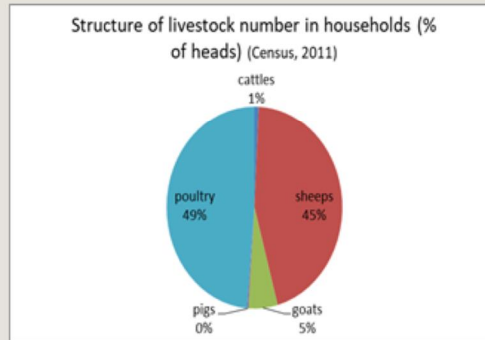


80% of employed population of age above 65 is in agriculture, while the most of young population (15-29) is employed in service sector.

Agriculture is job intensive sector since it creates 6% of the local revenue and employs 15% of labour force.

Agriculture: Key facts

- Agricultural land covers **10.802 ha (5,8%)** of the LA surface
- **Land fragmentation:**
 - Average size of agricultural cultivated land is 1.17 hectares
 - 55% of family farms have less than 1 hectare of agricultural cultivated land
- Land use:
 - karst pastures (15%),
 - vineyards (21%) and
 - olive groves (53%) in 2015 (ARKOD).
- Livestock:
 - small size: total number of domestic animals in households was 32.652 in 2011.
 - based on sheep, poultry and goats
- Man-made **terraces** and **mosaic agriculture**



Threats:

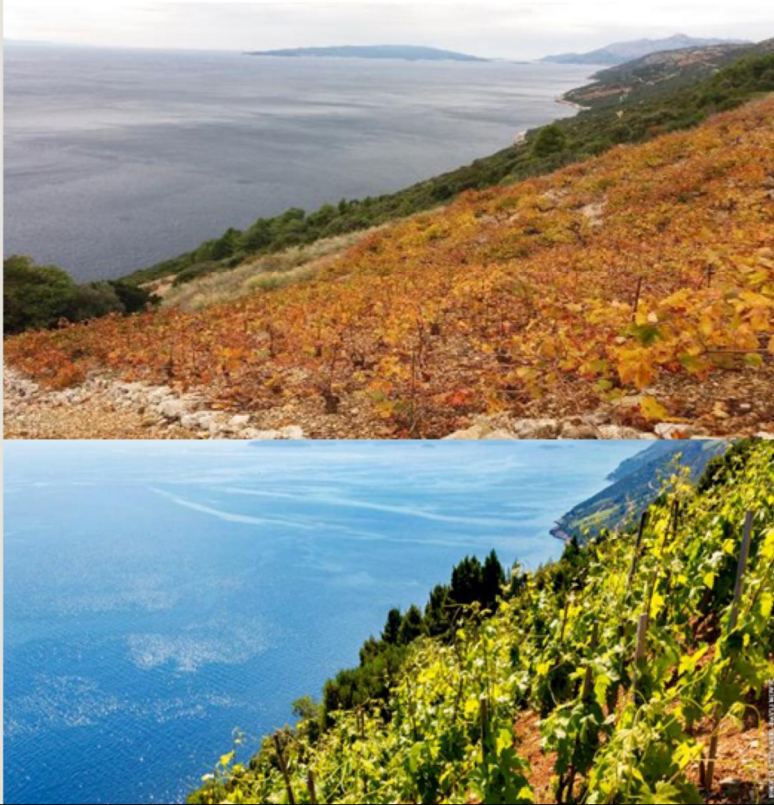
Agriculture in Croatian Islands is particularly sensitive to *drought* periods and extreme temperature shocks. Rainfalls transmit pollutants (e.g. sulphur) to the agricultural areas on islands (*which for now does not represent a significant environmental threat*). On the other hand, intensive agriculture on islands pollutes environment, such as vineyards on Vis, Korčula, Hvar and Pelješac (Kružić and Povh Škugor, 2015:41). Furthermore, *forest fires* which are very often in summer in the Coastal Croatia degrade natural habitats, improve soil erosion, and contribute to extinction of various species.

Use of main production factors explaining HNV features

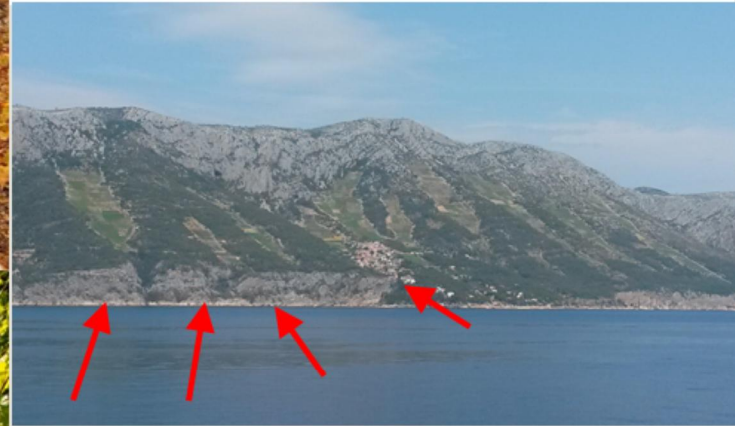
- **Large wine producers:**
 - own grape or grape from local suppliers;
 - machines or labor work (Dingač, a type of wine is cultivated on very steep slopes and thus, it is labor intensive production);
 - chemicals (copper sulphate, mineral fertilizers, herbicides and pesticides)
- **Small wine producers:**
 - do not use mechanics,
 - family labour force,
 - copper sulphate
 - manure
- **Production practices which promote HNV farming:**
 - vineyards on slopes and terraces – dryer terrain, herbicides and pesticides not needed, use of mechanics is not possible
 - olive cultivation in general is meant to be closer to HNV principles than grape cultivation
 - vegetables are produced mainly for own consumption and are thus usually more environmentally friendly.

(AgroParisTech final presentation, 2017, slide 56)

Vineyards (Dingač, Pelješac) **located** on very steep slopes reduces need for chemicals and disables use of mechanics



Vineyards on steep slopes (south-west of island Hvar)



Dingač is a specific location on island Pelješac at very steep and sunny slopes. It is adequate for cultivation of high quality black grape plavac mali. Wine produced at this specific location is also cold Dingač. Steep slopes and sun enable very fast runoff and created very dry microclimate which prevents development of grape illnesses. Weed growth is also limited due to this specific terrain. Due to very limited accessibility, grapes are cultivated by hand using safety ropes (to prevent falls down the slope). There are other similar sites within the LA.

Photo credit: LAG5 (left); EFST (right)

Endangered species and HNV farming

Iris

- status: least concerned



Iris pseudopalida, Korčula (Jasprica i Kovačić, 2014, str. 21)

Salvia

- status: near extinction



Salvia brachyodon Vandas, Author: (Jeričević, M., 12/10/2014,; source: Flora Croatica Database; available at: <http://hirc.botanic.hr/fcd/Galerija/Slika.aspx?IdPicture=64269>)

Orchidaceae

- Status: vulnerable
- Threat causes: agricultural land use abandonment and progression of machia and forests
- Friendly habitats: abandoned terases with vineyards and olives (Jasrpica and Kovačić, 2014:85)



Orchis tridentata Scop (Author: Marija Kovačević, 16/5/2015; source: Flora Croatica Database; available at: <http://hirc.botanic.hr/fcd/show.picture?IdPicture=81589&thumb=1>)

Tansy (cro. Buhač; lat. *Tanacetum cinerariifolium*)

- Status: endemic
- natural pesticide
- contributed to the local economy between two world wars
- habitats: rocky terrain, bušici, olive groves, vineyards (Jasrpica and Kovačić, 2014:85)



Tanacetum cinerariifolium (Trevir.) (Author: Ružičić, M., 12/11/2014; source: Flora Croatica Database; available at: <https://hirc.botanic.hr/fcd/Galerija/Slika.aspx?IdPicture=65061>)

Dalmatian islands are a very important area of biodiversity. Land use abandonment is recognized as the major threat for biodiversity due to succession caused by lack of mowing and pasture (Nikolić et al, 2009:23) The greatest biodiversity found

Dalmatian Islands time line

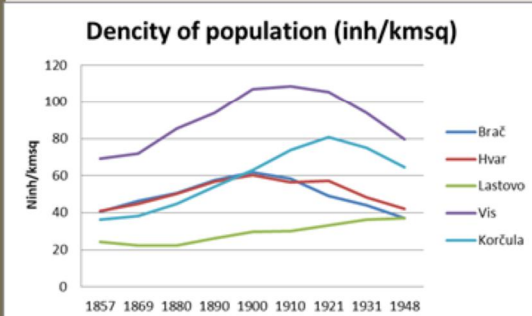


The timeline consists of four periods:

1. Heritage from the past (-1945)
 - ends with WWII
2. Extraction of capital accumulation from agricultural, collectivisation and agrarian reform (1945-1967)
 - end with abolishment of mechanics purchase prohibition in agriculture
3. Associated labor organisations for cooperation and economic crises (1967-1990)
4. Croatian independency (1991-present)

Heritage from the past

The rural society: villages, roads, economy



Data source: CBS from Jovanović et al, 2010



Transport: Orebić, Pelješac (left, source: LAG5) and Vela Luka, Korčula (right, source: LAG5)



School in Pitve (Hvar) abandoned today and with numerous pupils before 1912. Sources: Museum documentation Center, 2013 (author: Denis Bučar) and Goleš, 2014



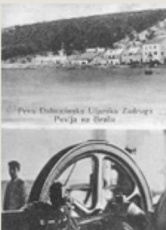
Shipbuilding in Korčula, around 1904 (Goleš, 2014)



Sardine processing factory in Komiza (Vis), before 1927 (Klub jugoslavenskih pomoraca, 1927)



quarry on Brač (source LAG Brač)



The First Dalmatian Oil Cooperative Ploče, established in 1899 (source: LAG Brač)



Up: Members of cooperative during wine trade in Vela Luka, Korčula (Bašić, 2007)
Right: Hotel Tomic, Vis, printed in 1912 (Goleš, 2014)



Population: The highest number of people has been identified at the beginning of 20 century, (high fertility rates has been overcoming long-lasting depopulation process that has been started in 19 century till 1921)

Cities: Several municipalities had some legal characteristics of towns (e.g. Korčula)

Transport: weak connection with mainland (islands were focal point in transport and trade networks by the end of 19th century)

Governance: local self-government, top-down decision-making, one municipality per island

Main economic activities: The economy of LA Dalmatian islands had been defined by natural environment and therefore its structure was very simple with large number of areas of economic activity missing or weakly present (islands were highly depended on agriculture production).

Cooperatives: The first agricultural cooperative in Croatian Islands was established in 1864 in Korčula (Mataga, 2005)

- several attempts during 20th century to substitute agricultural dependency by industry: shipbuilding (Korčula), navigation (Orebić), food production (Postira-Sardina), stone extraction (Brač)
- since agriculture on island was not very productive, a need for development of other sectors was present. Fishing and fish processing were lowering dependency on other agricultural activities. Quarry flourished due to high demand for local marble and other types of stone.
- foundation of tourism
- trade, and thus, shipbuilding, was fostered during the golden period of wine export. Capital accumulated in agriculture was directed toward trade.

Source of photo on the bottom left: <http://www.mdc.hr/hr/mdc/zbirke-fondovi/fototeka/muzej-opcine-jelsa-vinogradarski-muzej-pitve/>

The wine boom of the late XIXth century – the early XXth century crisis



Vis port in time of grape collecting, postcard used in 1906 (source: Goleš, 2014)



Italian ship Orazio which was transporting inhabitants of Brač to Chile, from 1932 to 1940 (Ostojić Petrov, 2007)

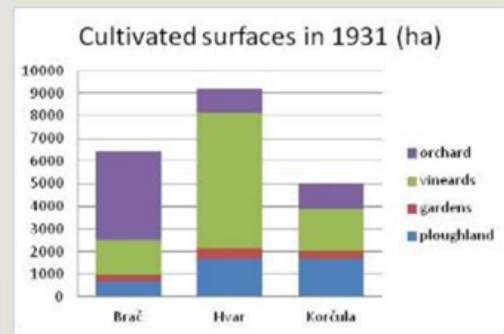
Causes and consequences:

- à phylloxera in France and Italy (after 1850)
- à Increased demand for wine from Dalmatian islands
- à Intensive plantation of new vineyards in Dalmatian islands
- à There is sufficient labour force but limited agrarian surfaces.
- à Deforestation, construction of terraces, cutting olive trees
- à Maximum number of vineyards surfaces around 1890
- à Entrepreneurship development, land ownership growth, maritime transport , trade, establishment of cooperatives
- à 1892 Wine clause: Wine import from Italy to Austro-Hungarian empire is allowed
- à Decline of wine demand (wine prices drop from 25-30 forinters/hl to 6-12 forintes/hl)
- phylloxera in Dalmatia (from 1894)
- à Agricultural and economic crises and emigration at the beginning of 20. st.
 - Despite very high natural population growth, Brač and Hvar and suffered an absolute fall in population in 1910 due to emigration (Antić, 1995:294).

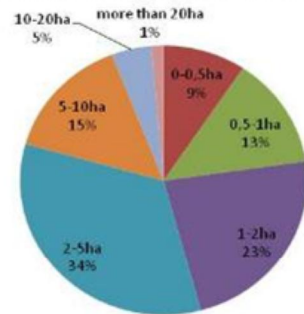
Farming: wine made by small farms



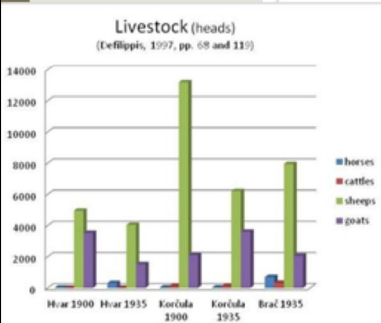
Loading of wine on ships (Maršić, 1892)



Land size structure on Dalmatian islands (%) in 1931 (source: Defilippis, 1997:125)



Source: authors based on data from Defilippis (1997:112)



Traditional equipment for olive processing (EFST)



Advertisement for chemical fertilizer from 1930 (Poljodjelski vjesnik, 1930:88)

Ø After 2nd World War agriculture dominates in Dalmatian area

- Share of agricultural in active population in 1953 is 61%, based on Population Census (Defilippis, 1997:143)

Ø Vineyards dominate in Dalmatian Islands in 1931

- End of 19th st. and beginning of 20st is characterized by short period of growth and then decline of wine market
- Due to phylloxera in France and Italy demand for wines from Croatian islands increased

Ø Farmland fragmentation => no capital accumulation

- Among the regions in A-H monarchy, Dalmatia was ranked first in percentage of farms of size less than 2ha, and last in percentage of farms larger than 10ha
 - § 1902 61,52% of farms had size less than 1ha (Antić, 1995:292)
- October 19 1930 – Law on liquidation of agrarian relationship
 - § Feudal relationship is abolished
 - § Peasants became land owners and landlords get reasonable reimbursement
 - § land fragmentation

Ø Livestock:

- Dalmatia in general is relatively poor in terms of livestock compared to Croatian regions. Domestic animals are even less present in Dalmatian Islands. Based on data from 1900 and 1935 it can be speculated that up to one hundred cattle, between 5 000 and 10 000 sheep and goats are expected to be found on a Dalmatian island before WWII.
- Special breeds of sheep pramenka evolved in islands due to isolation, for example in island Brač. Pramenka gives low returns but it is very resistant and adaptive to extreme conditions such as on islands. Defilippis (1997:224) mentions that breeding of sheep pramenka is mostly oriented on lamb production. Common way of production is in cattle of 20-30 animals which are kept in enclosed pastures and olive groves. They are given additional feeding and their return is 1,5-2 youngsters per year which is considered as a cost-effective production.

Deforestation, wine, terraces and erosion

Deforested landscape around Hvar around 1911
(Goleš, 2014)



Landscape in Čara (Korčula) postcard used in 1911
(Goleš, 2014)



Stone walls and mosaics in Selca (Brač) around 1912
(Goleš, 2014)

Ø Erosion – a consequences of wine crises and previous deforestation for the landscape:

- "The naked mountains do not give sufficient pasture for the livestock. The unorganised water and mountain streams disperse the juices of the land" (from newspaper Hrvatska riječ, in Antić, 1995:298).
- There is a vicious circle: Insufficient pasture forces shepherds to let their animals (goats and sheeps) eat young plants. In this way pastures regenerate even more slowly. The landscape remains bare and erosion progresses.

Ø Large human pressures on pastures and forests till 50-ies (Defilippis, 1997:27-28):

- heating
- wood as construction material
- grazing (goats in particular)
- heating for lime production

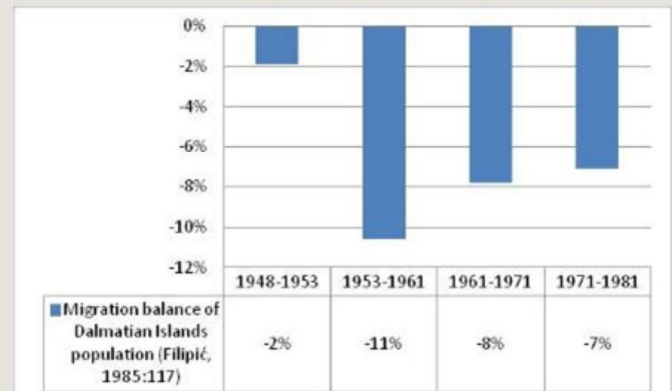
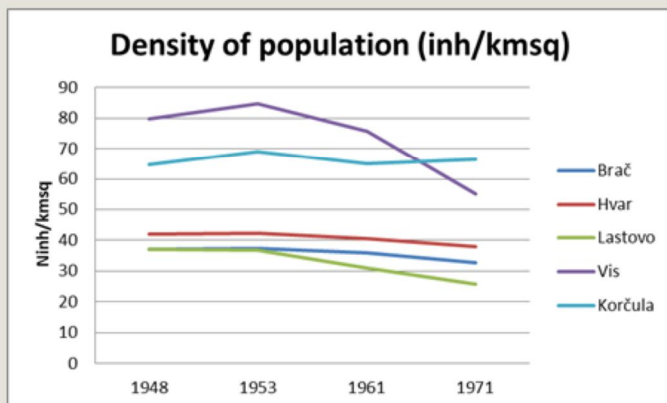
1945-1967

Industrialisation and deagrarisation

Changes in the rural and social context



One of the first high comfort pavilions of hotel Bijela kuća, in Bol (Brač), constructed in 1963 (Source: Vlahović, 2008)



Institutional context and main issues of development: After 1945 and Before 1990s, LA Dalmatian Islands had been part of socialist Yugoslavia that had a tradition of so-called socialist self-management, with a specific participation at the local authority or municipal level. LA Dalmatians islands were represented with usually one municipality by island. The decision-making in this system were top-down and non-transparent, with informal and impenetrable groups of enterprise managers and senior party officials in control, and with other bodies (e.g. the Workers' councils) existing as a largely powerless bodies (Stubs and Starc, 2007)

Population: The number of people had been decreasing (fertility rates decreasing and long-lasting depopulation process – political and economic motivation)

Cities: have massive differences regarding socio-economic characteristics That is to say?

Transport: By losing the geostrategic and economic importance, transport networking between islands were weak and only development were between the islands and mainland.

Main economic activities: Development of agriculture under cooperative framework and attempts to implement some other activities (e.g. shipbuilding, navigation, food production and tourism).

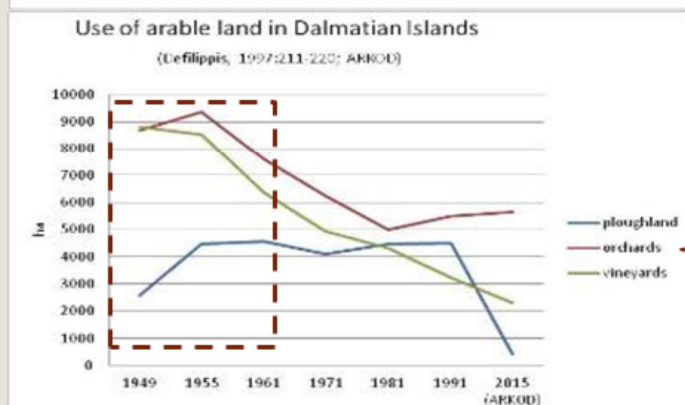
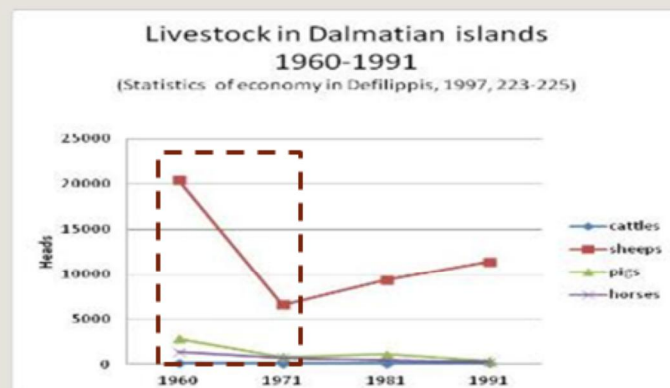
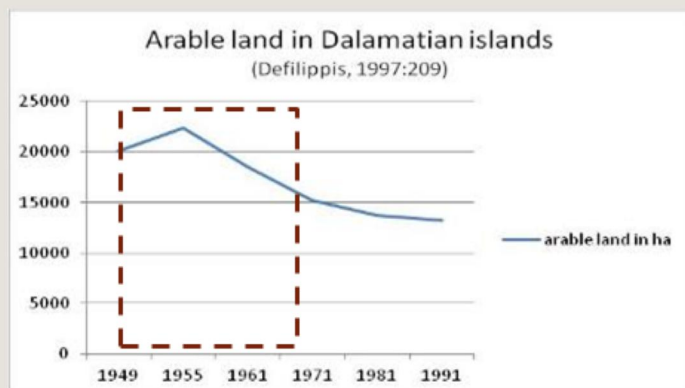
Extraction of capital accumulation from agriculture – cooperatives



After WWII members of cooperative renovate winery Grgić and wait for first cooperative truck (Pelješac), (Bašić, 2007)

- Agrarian policy measures (Law on agrarian reform and colonization, 23/8/1945):
 - Forced establishment of peasant labour cooperatives (similar to Russian kolhoz), abandoned in 1953
 - Farmland maximum of 25-35ha, in 1953 diminished to 10 ha
 - A ban which prohibited purchase of farming mechanics which was partly relaxed so that purchase of second-hand mechanics was allowed in 1953 and it was completely relaxed in 1967.
 - Permanent consequences for cultivation of grape
 - § Public good problem => vineyards become collective property and individual incentive was lacking
 - § Vineyards were not cultivated carefully; the consequences were permanent
 - Compulsory redemption of farming products
 - Free work obligation
 - The result is cheap labor and inputs necessary for fast industrialization. Due to tremendous political and economic pressures on farmers, rural population intensively abandons its farmland and moves to urban areas.
- Period between collectivization and agrarian reform (1953-1967)
 - Family farms became involved in social reproduction by cooperation between family farms and cooperatives or social enterprises
 - Cooperatives became important economic and social institutions in rural areas.
 - Small farm unites (less than 2 ha) represent more than half of all farming unites (Defilippis, 1997:155).

Agricultural development



comprises olive groves

Trends in agriculture:

Ø decrease in arable land size

Ø livestock:

Ø Sheep dominate in number but it sharply decreases in this period. Numbers of horses, pigs and sheep fall as well.

Ø 1954 Law on prohibition of goat keeping

- Since goat keeping in public pastures was considered as an important obstacle to forest regeneration, goat keeping was restricted in several attempts dating back from the end of 19th century. The most rigorous was the law from 1954 when goat keeping was prohibited and goats had not been registered any more in official statistics. The law was abolished in 1982.

★ **REMARK:** Available agricultural data that refer to Dalmatian islands for period 1945-1990 include municipalities from that period of Brač, Hvar, Vis Korčula and Lastovo (Defilippis, 1969:2), and do not include islands Šolta, Pelješac and Dubrovačko primorje. For this reason, presented data serve for obtaining general insights, but not for exact comparison with other periods.

Ends of traditional society in landscape



Japjenica
(Source: LAG Brač)



Goat keeping, landscape and transport till
1970-ies
(Source: LAG Brač)

Ø Depopulation and deagrarianization trends decrease pressures on land. However, this processes are at the beginning in this period and traditional way of living still requires use of wood for construction and heating while that wood can hardly be regenerated due to animal grazing (especially goats which are prohibited but still present).

Ø Japjenica

- a traditional technique lime preparation for building. Lime had to “baked” for several days. Thus, this process required cutting off a lot of wood/bush on nearby surfaces (Source: LAG Brač).

1967-1991

From economic reform to economic crisis and end of socialism

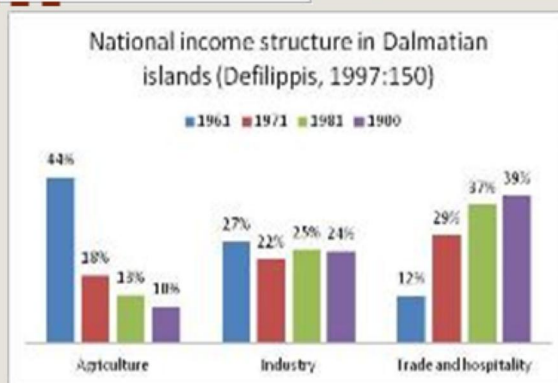
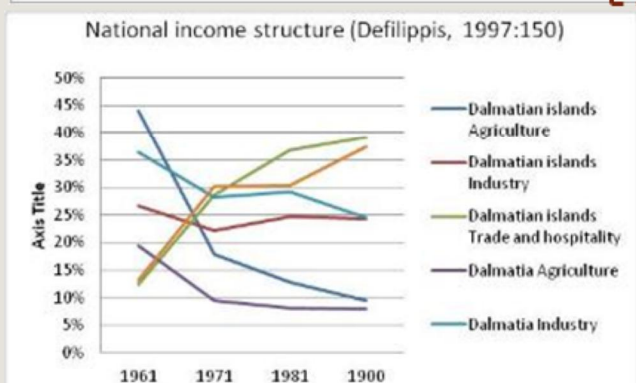
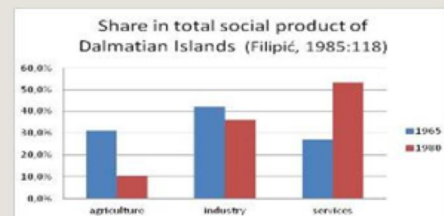
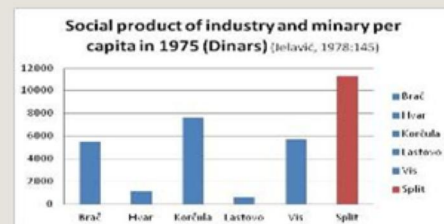
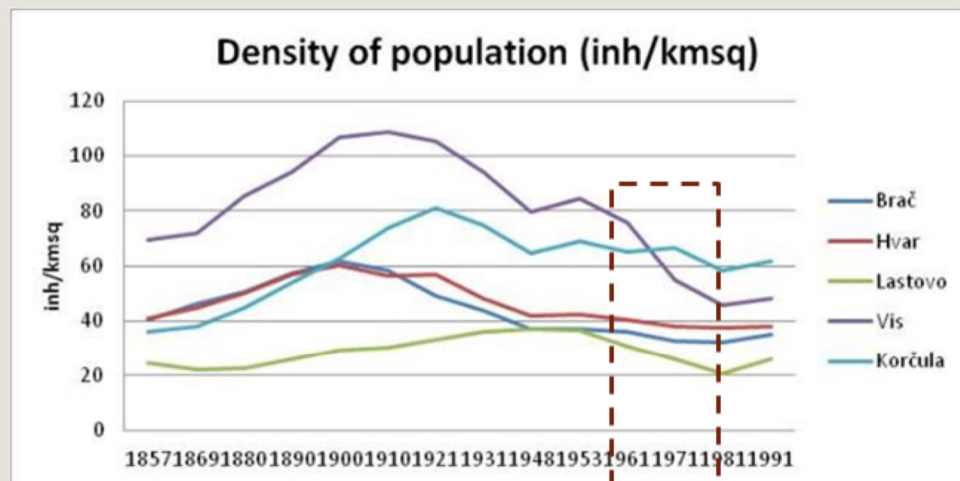
A large economic reform was introduced in 1964/65 which introduced some market mechanisms into socialist economy transforming it into so called "self-governed economy". Export was liberalised. Such changes boosted industrial development and cities growth, as well as labour flow from rural to urban areas.

In 1967 a ban on purchase of machinery was abolished. From this year family farms can freely buy tractors and other machinery equipment. A model of small family farm supported by additional income (employment in industry) become a dominant and successful.

In 1976, one quarter of family farms which increased their size mention an acquisition of the machinery equipment as the main reason, while 70% of family farms which diminished in size mention a decrease in a household labour force as the main reason.

The period ends with establishment of a new state Republic of Croatia (RH) and shift from socialism to capitalism.

Depopulation continuation and tourism development

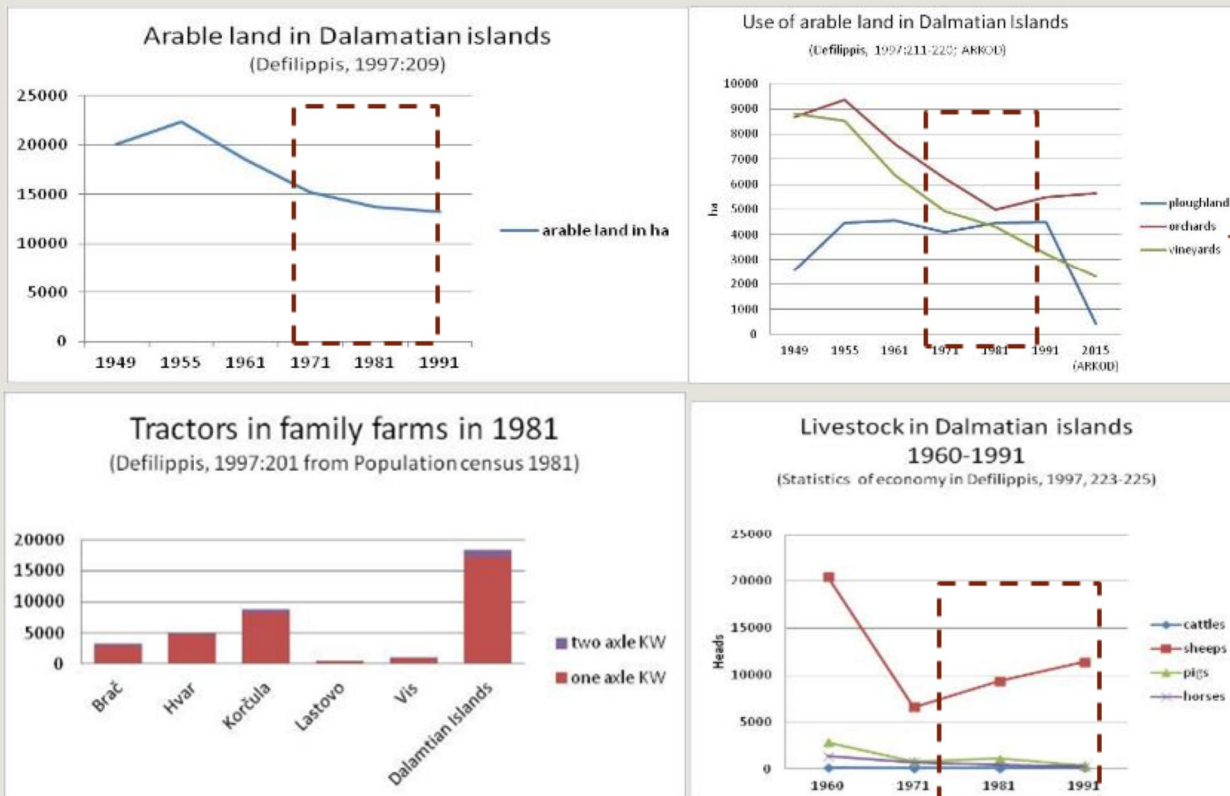


- rural depopulation and migration of young population to cities
- Ø main reasons: feeling of isolation and detachment from the social dynamics in the other parts of the region as a consequence of weak transport connections (Filipić, 1985:117)
- Ø young and male populations emigrates => feminisation and aging of the island population
- deagrarisation continues
- development of tourism on islands (annual growth rate of service sector on islands was 12,2% in period 1965-1980 (Filipić, 1985:118)).

This period is characterised by agricultural decline and tourism growth. Industry grows at much smaller rates than tourism.

REMARK: According to estimations from National island development program (1997:9) estimated number of inhabitants (based on actually present population and natural population dynamics) in islands of Dalmatia in 1991 was smaller than numbers recorded in official statistics for years 1981 and 1991.

Agricultural development



involves olive groves

Sub-periods of agricultural development:

Ø Associated labor organizations for cooperation (1967-1980)

Cooperatives transform into self-governed enterprises which are income oriented.

Due to abolishment of the ban on purchase of mechanics, massive mechanization of small family farms take place in this period. Thus, small family farms become more productive.

Ø Economic and social crisis (1980-1990)

- Introduction of new olive oil processing plants (1980-1990):
- movement of olive grove revival
- plantation of new olive trees

Trends in agriculture:

Ø decrease in arable land size

- olive groves revival
- vineyard abandonment

Ø livestock:

- significant increase in number of sheeps (probably due to goat substitution)
- slight increase and then fall in number of pigs
- sight increase in number of cattles
- decrease in number of horses

Ø small machinery dominates in family farms (above 90% in number and in kW)

Consequences on land use and biodiversity

depopulation

arable land decrease

goat keeping prohibition

first stages of forest succession



- Forest succession, instead of oak regeneration, dominantly refers to development of Pine forests which are usually linked to low level of biodiversity.
- Development of garigue and "makija"
- Introduction of chemicals in agriculture

Photo credit:

LAG Škoji (Komiža, island of Vis)

1990-present

Period of Croatian independence and transition to capitalism.

Institutions and actors

Presentation of Leadership program, 2017

Meetings of municipalities and LAG representatives

Annual assembly of LAG5

Workshop with local stakeholders in Korčula, 2016 (autor: Lovrinčević, M.)

NN 34/1999, Zakon o otocima

ZASTUPNIČKI DOM HRVATSKOGA DRŽAVNOG SABORA

Na osnovi članka 89. Ustava Republike Hrvatske, donosi se

ODLUKU

O PROGLAŠENJU ZAKONA O OTOCIMA

Proglasivši Zakon o otocima, koji je donio Zastupnički dom Hrvatskoga državnog sabora na sjednici 26. ožujka 1999.

Broj: 081-99-692/1
Zagreb, 1. travnja 1999.

Predsjednik
Republike Hrvatske
dr. Franjo Tuđman, v. r.

ZAKON O OTOCIMA

1. TEMELJNE ODREDBE

Interes Republike Hrvatske za osobitom zaštitom otoka

Članak 1.

- (1) Otoki kao hrvatsko prirodno bogatstvo, te nekretnosti na otocima osobitoga nacionalnoga, povijesnoga, gospodarskoga i ekološkoga značenja, od interesa su za Republiku Hrvatsku i imaju sjetna osobitu zaštitu.
- (2) Ovaj Zakon temelji se na načelima Nacionalnog programa razvoja otoka (u daljnjem tekstu: Nacionalni program) i njime se uređuje upravljanje otočnim razvojem na državnoj i lokalnoj razini te na razini gradova, općina i općina.
- (3) Na odnose uređene ovim Zakonom primjenjuju se opći propisi, a u svim pitanjima koja nisu uređena ovim Zakonom.

Razvrstavanje otoka u skupine

Članak 2.

- (1) Otoki se glede demografskog stanja i gospodarske razvijenosti razvrstavaju u dvije skupine.
- (2) U prvoj skupini su sjedeći nastanjeni ili povremeno nastanjeni otoci: Ušće, Susak, Srčane Vele, Srčane Male, Dvořik, Mlani, Prvič (Izračarsko otočje), Goli, St. Grgur, Premuda, Silba, Olib, Škarda, Ist, Molat, Dugi otok, Zvirinac, Sestrunj, Rovinj, Rava, B. Orljak, Dubac, Vigada, Prvič (Ibrensko otočje), Zlarin, Kaprije, Zlatje, Veli i Mali Dvořik, Šćedro, Vis, Brijuni, St. Andrija, Lastovo, Sušac, Vrniki, Mljet, Šipar, Lopud, Korčula, Lokrum, Korčuli i otoci Žrnjinskih skupine.
- (3) U drugoj su skupini svi nastanjeni otoci koji nisu razvrstani u prvu skupinu i poluotok Pelješac.

The first page of Island Act (OG, 1999/34)

Governance: many small local-government units which do not have sufficient fiscal capacity for good governance and effective management.

The Island act: The situation in LA Dalmatian islands has been determined also by unique institutional characteristics of the islands. The institutional differentia specifica of the islands has been tried to implement in national programmes and regulatory frameworks such as: National Island Development Programme (1997) and the Island Act (1999, 2002, 2006). This programmes have been partially implemented (Stubs and Starc, 2007)

Relevant institutions:

Ø 2 the most relevant ministries:

- Ministry of regional development and EU funds

Ø Department for Islands

Ø Island Council (consultative body to the Ministry)

Ø Ministry of agriculture

Ø Paying Agency for Agriculture, Fisheries and Rural Development

Ø Advisory Office for Agriculture (Poljoprivredna savjetodavna služba)

Ø Local agriculture cooperatives

- since 1864 and first agricultural cooperative on Croatian islands established on Korčula
- important local rural stakeholder during Yugoslavia (before 1991)
- neglected after Croatian independence
- recently reestablished in a modified form

Ø LAGs (Leader Program)

- focal point of comprehensive development with participation of local community
- Škoji (Šolta, Hvar and Vis), LAG5 (Pelješac, islands Mljet, Korčula, Lastovo and municipality Dubravačko primorje) and LAG Brač (Brač)

Changes in the rural and social context

The main trends during the whole timeline:

- ↗ Depopulation
- ↗ Ageing

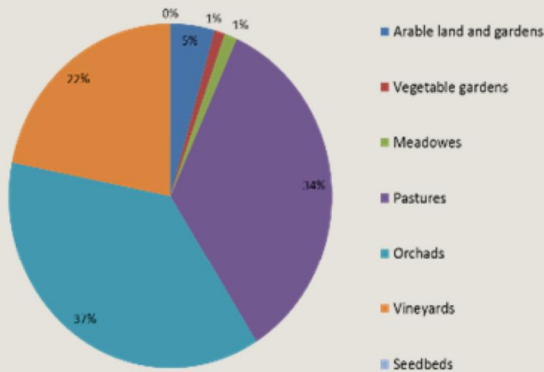
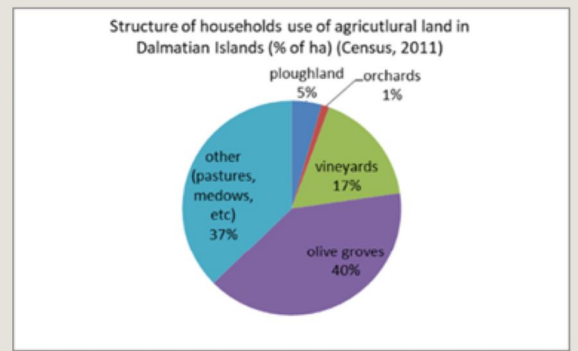


Size of a class in Korčula in 1977 and 36 year later in 2013

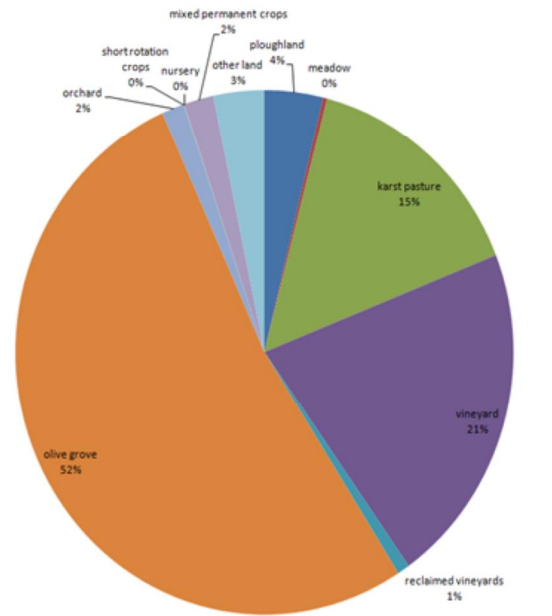
Despite significant infrastructural investments (public utilities, transportation network, electricity, telecommunications) depopulation trends continue. Its manifestation is size of school classes.

Agricultural development: Olive groves revival

agricultural land covers 10.802 ha
or only 5,8% of the LA surface
(ARKOD, 2015)



The LA's structure of total
utilized agricultural land by
categories, (CBS, 2003)



Types of agricultural land use (% of ha) (ARKOD, 2015)

- Ø Relatively recent sources of data about agriculture in LA Dalmatian Islands:
 - 2015 - Paying Agency for Agriculture, Fisheries and Rural Development (PAAFRD) and National register for agricultural land use (ARKOD)
 - 2011 – Population Census
 - 2003 – Agricultural census (Croatian Bureau of Statistics [CBS])
- Ø Agricultural land covers 10.802 ha (5,8%) of the LA surface with following dominant types: karst pastures (15%), vineyards (21%) and olive groves (53%) in 2015 (ARKOD).
- Ø Although different motivation and data collection methodology applies, graph on the left based on Agricultural census (CBS, 2003) reveals similar structure: vineyards occupy 21% of utilised agricultural land, orchards and pastures is consistent with sum of olive groves and karst pastures from ARKOD (2015). The olive groves are contained under orchards in CBS (2003) and one can speculate that from 2003 to 2015 registered olive groves surface increased, while pasture surface decreased. Motives might be linked to subsidies as well as to actually transition processes. Revival of olive grove cultivations is taking place. The same structure is revealed in data from Population Census (2011).
- Ø State subsidies were asked for 70% of cultivated land in 2015, mostly as a compensation for natural and other constraints, as well as for preservation of autochthon and protected species. 5,64% of surfaces with demanded subsidies refers to transition to ecological practices. There are no demands for HNV farming practices such as for maintenance of field strips or HNV pastures, except for maintenance of extensive olive groves. (Croatian system of subsidies for agriculture includes several subsidy types for HNV farming practices just mentioned).



Vineyards on slope on Pelješac peninsula



Vineyards in the field, Trnovica, Dubrovačko Primorje



Traditional, extensive way of collecting olives (photo from 60-ies above, source LAG Brač) still dominates in LA Dalmatian islands (photo from 2016, source: Katarina Jakšić). However, olives can be collected by supportive mechanics (photo on t, source LAG 5)

Ø Two types of vineyards (photos on the left):

- on slopes - more labour intensive but require less chemicals
- in the flat fields

Ø Olive collecting process through time (photos on the right)

- traditional labour-intensive process of olive collection dominates since terrain is usually inaccessible

Ø Bee-keeping is important link in agriculture

Photo credit:

LAG 5

Katarina Jakšić

Wine production: Introduction of modern equipment



Stone grinding machine, Plančić, Hvar (source: Krstulović, 2008)



Revival of vineyards in Pelješac



Grgić winery on Pelješac suffered tremendous loss in 2015 due to the forest fire in surrounding (source: LAG5)



Interview with a manager of winery Grgić and barrels for wine keeping, 2017 (source: EFST)

Livestock



Sheeps on Brač (2016, source: Slađana Pavlinović)

- Livestock is based on sheeps, poultry and goats
- Total number of domestic animals in households was 15.881 in 2011

Livestock	Number of head
cattle	252
sheeps	14.685
goats	1.754
pigs	80
poultry	15.881

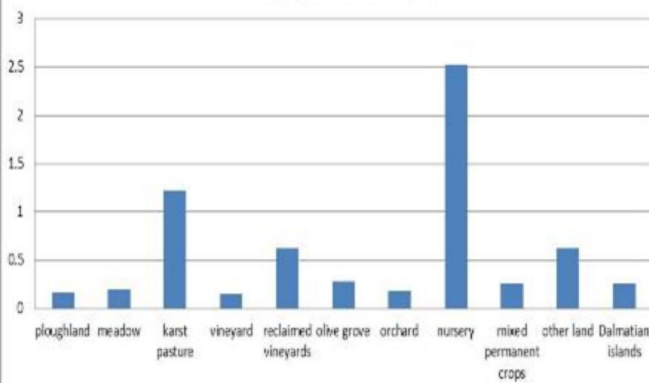
In LA region there was a total number of livestock of 32.652 heads in 2011 (Census) out of which around 15.881 was poultry and 14.685 sheep. However, collected data do not allow detailed spatial livestock analysis.

Fragmentation

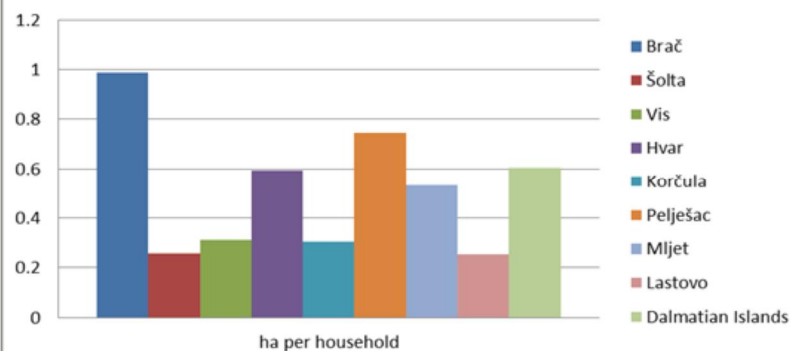
- Highly fragmented lands with 40 552 parcels
- Average parcel size: 0,27 ha
- data source is ARKOD (2015), a national register of agricultural land use

- 21.701 households registered at Census (2011) used 13.138 ha of agricultural land
- Average surface of used agricultural land per household is 0,6 ha per household.

Average parcel size (ha)



Agricultural land used per household (Population Census, 2011)

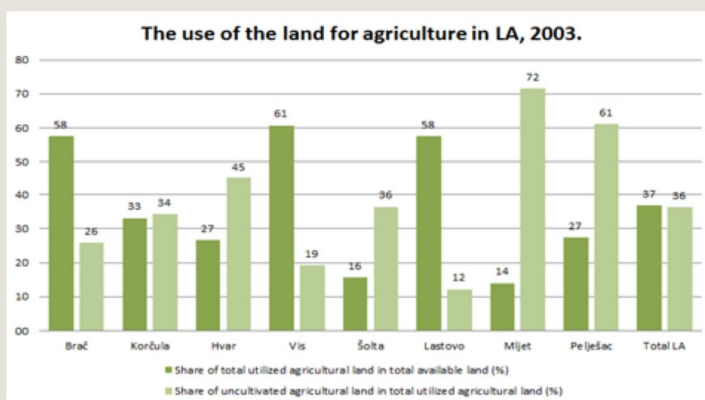
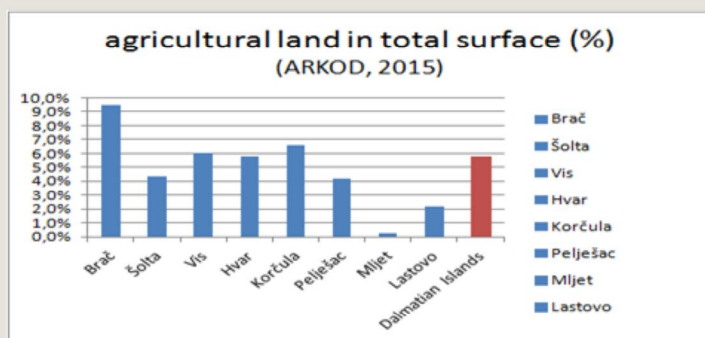
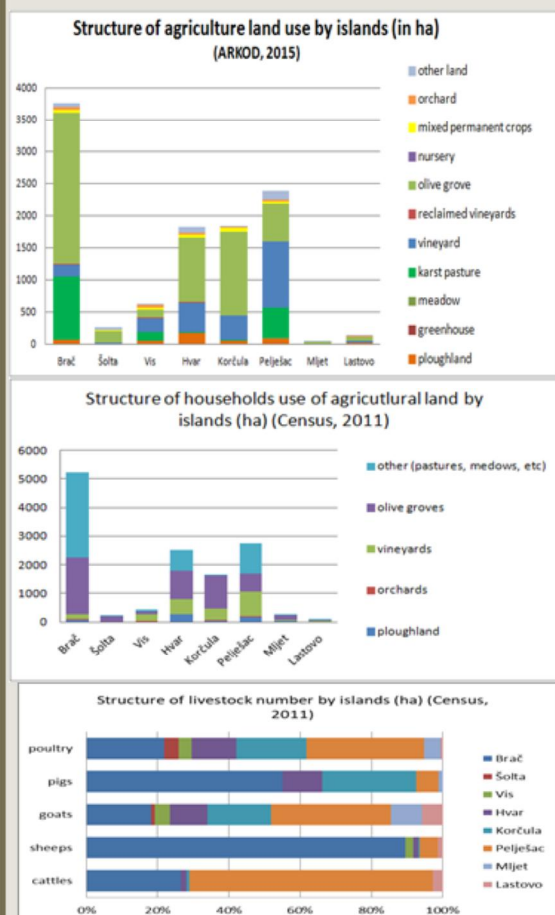


Ø Highly fragmented land and mosaic:

- average parcel size of 0,27 ha (ARKOD, 2015)
- average surface of used agricultural land per household is 0,6 ha per household (Population Census, CBS, 2011).

Ø Implication: limited machinery usage and high demand for labour force in agriculture

Agriculture: heterogeneity among islands



- Ø According to the latest Agricultural Census (2003) the total available land on LA Dalmatian Islands covers 26.286 hectares. Total available land comprises of total utilised agricultural land and other other land. The other land includes unutilized agricultural land and wooded area. The total utilized agricultural land includes arable land and gardens, kitchen gardens, meadows, pastures, orchards (total), vineyards (total) and nurseries. In 2003 the share of total utilized agricultural land in total available land for LA Dalmatian Islands was 37%, while 36% of utilized agricultural land was not cultivated. Brač, Vis and Lastovo are above the average with respect to share of utilized agricultural land in the total available land in LA Dalmatian Islands. Furthermore, they show the highest level of cultivation of utilized agricultural land as well.
- Ø The more recent data do not provide the info on total available land in hectares although they show that agriculture covers 5,8% of total surface of the LA Dalmatian Islands (ARKOD, 2015). This corresponds to the percentage of arable land on islands (National island development plan, 1997:20). Brač continues to be the leading island in terms of agricultural land use, while Mljet (with majority of its surface under national park) has the lowest share of agricultural land use in both analysed years 2003 and 2015.
- Ø Due to karstic area specificities, although limited, agriculture represents very important aspect of life on islands. Together with non-agricultural activities agriculture on islands can assure decent life standard (National island development plan, 1997:22).

Data from Census (2011) indicate certain level of specialization among islands:

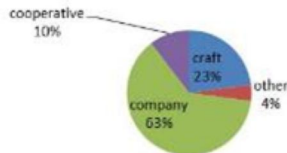
- Pastures - Brač which is famous for its lamb production
- Olive groves: Brač, Hvar and Korčula
- Vineyards: Pelješac and Vis
- Brač: pigs and sheeps
- Pelješac: goats and catties

Farms

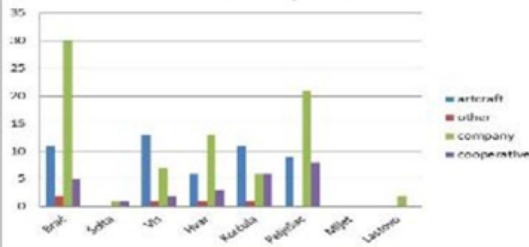
Legal entities in agriculture

- family farms is the most common organisational type of agriculture in Dalmatian Islands

Structure of legal entities in agriculture, other than family farms in 2015



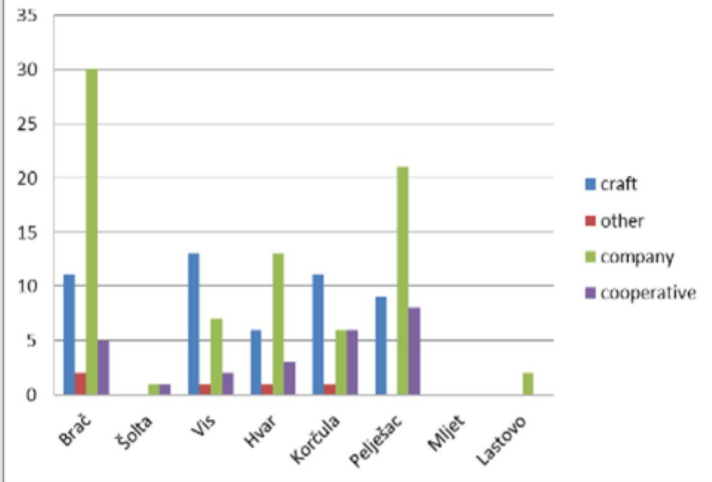
Legal entities in agriculture, other than family farms



Family farms

- Most family farms employ 1-2 persons
- Korčula dominates in family farm number and (additional) members.

Legal entities in agriculture, other than family farms



Ø There were 5.831 family farms in LA Dalmatian Islands in 2015

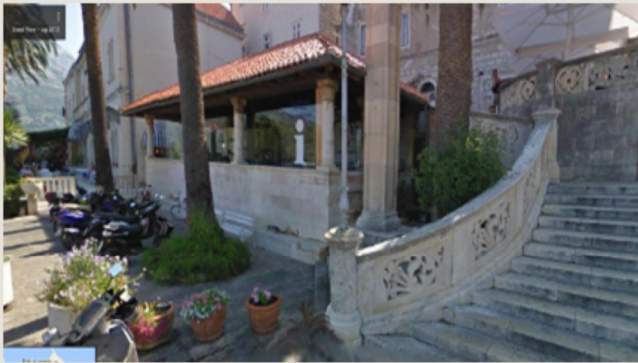
- three quarters are governed by males and one quarter by females
- 4818 members (beside holders of the farms, i.e. every farm has a holder, and some farms have additional members).
- Thus, 10.649 persons are active in family farms.

Ø Consequences of family farm dominance in numbers:

- small-scale production
- low capital-intensity agriculture
- can be full-time, but also a part time agriculture (no further relevant data)

Tourism and apartmanisation

- Since 1991, in particular since 2008, growing importance of tourism and related activities



Fish market place in 1950-ies is a tourist infopoint in 2000-ies

Mosaic agriculture as a setting for rural tourism (Brač)



Due to weak government enforcement tourism development is accompanied by significant construction activities (AgroParisTech, 2017:111)

On the left:
Space for fish marketplace is substituted by tourist info point

On the right:
Two types of tourism:
- agrotourism

- recognised as an opportunity for hinterland areas of island
- it can fit to the natural landscape

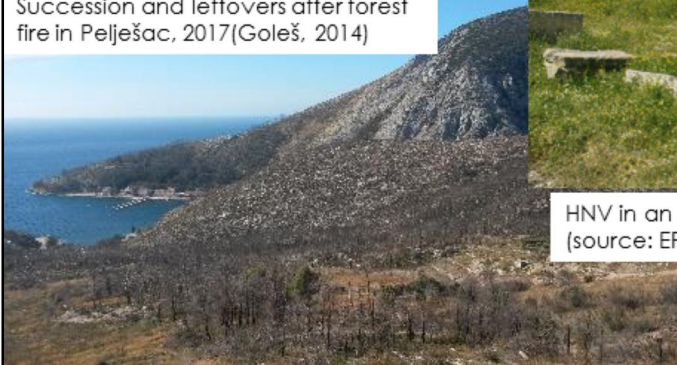
- tourism based on sea and sun
- intensive construction along the coast

Consequences on land use and biodiversity

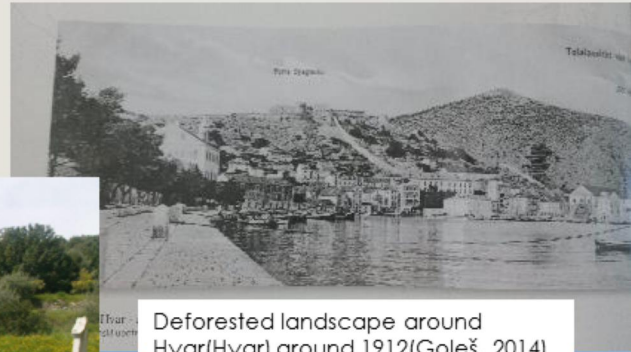
Man-made stone piles and walls – byproducts of the effort to extend scarce farming land – today abandoned, Brač, 2000 (source: LAG Brač)



Succession and leftovers after forest fire in Pelješac, 2017 (Goleš, 2014)



HNV in an archeological site, Vis 2014 (source: EFST)



Deforested landscape around Hvar(Hvar) around 1912 (Goleš, 2014)



Reforested landscape around Hvar(Hvar) in 2017 (source: Čurčin, N.)

Ø Abandoned agricultural land under forest succession is prone to forest fires (left).

Ø Once bare stony hills are green today (right).

Reforestation near Chapel st. Ante above Velo Grablje – Brusje (Brač)

In 1961 this area was lavender
plantation (right).

Today this area is abandoned
agricultural land covered by
underbush, process of extensification
(down).



Business as usual scenario

Where do we go in 2030 in the current situation?



Increase of fires due to land abandonment

BAU combines over touristic development by the shore with land abandonment in the inland, compatible with scarce individual farms able to manage. Landscapes are closing but no one really matters

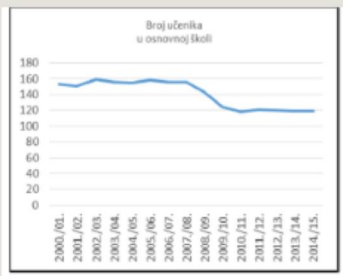
The main threats for the LA in the current situation is development of tourism infrastructure that will intensify the urbanization process and change the scarce agricultural land in the islands to building land. Increase in large scale infrastructure will put additional pressure to the environment in terms of communal infrastructure management and foster decline in biodiversity due to the reducing of the natural and semi-natural habitats.

If the current situation continues the major threats in the LA that are identified will further increase and cause permanent damage in terms of both tourist attractiveness of the area and biodiversity richness.

Photo Credit:

- Marija Roglić (Orebić, Pelješac peninsula)
- Pero Poljanić (Trstenik, Pelješac peninsula)

The rural development and social driving forces



Decreasing number of pupils in elementary



tourism growth: new hotels built



Characteristics of rural development in BAU scenario are the following processes:

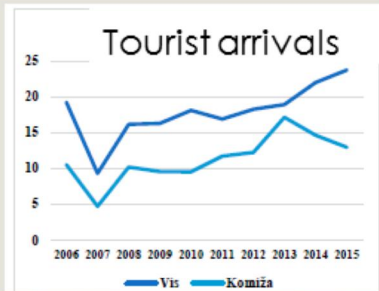
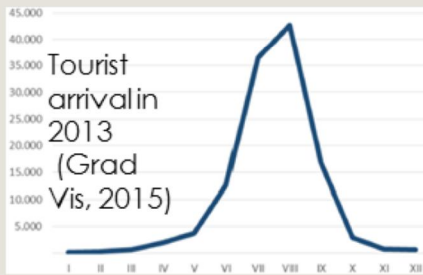
- Population decreases, but at a lower rate, partly due to negative natural population growth rate, and partly due to emigration of youngs population from islands. Process of population aging continues. Emigrated population returns to islands in older age.
- Since tourism development take place and services require a lot of labour force which is missing due to negative demographic trends, seasonal labour force is imported to island during summer period.
- new hotels are built and tourist resorts are developed. There is increased demand for attractive land with the sea view. Price of real estates increase which increases political pressures to convert agricultural land to construction land. Price of real estates additionally limits young population from choosing islands for settling down.
- Finally, inhabitants leave the island also due to physical isolation. Ferry connections are scarce out of the season. With bad weather ferries remain in their port which additionally pronounces sense of isolation. New catamaran lines to islands are introduced only for tourism purpose during summer.

Actors: local and residential population and NGO-s.

Photo credit: Slađana Pavlinović, Supetar, island Brač

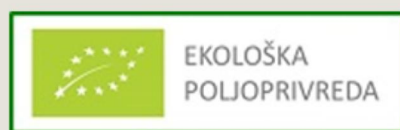
The economic driving forces

Food chains and market



- Tourist demand for vacations on Dalmatian Islands is very high, but with a very short season, limited by weather conditions. There are drastic differences in number of tourists along the year. Very crowded coasts of islands in summer are abandoned out of this season.
- Due to high demand for accommodation, accompanied by weak spatial planning and legal enforcement, process of so called „apartmanisation“ takes place along the coast. This leads to development of mass tourism in coastal zones while island inland is abandoned.
- tourism substitutes agriculture in terms of revenue sources. Locals orient to tourism as a source of revenues. Production of wine and olive oil grows and it is mostly exported or sold in expensive touristic shops at very high prices. During the season there is very high surplus demand for food which needs to be imported to islands by trucks loaded on ferries. National food market chains open their shops on islands.
- Local food marketplace and family farm production is marginalised due to dominance of large food retailers and food import to island. Hotels mostly offer imported food since adequate quantities at low prices are not available on islands.
- Actors: investors, property owners and managers, tourists, local population, family farms

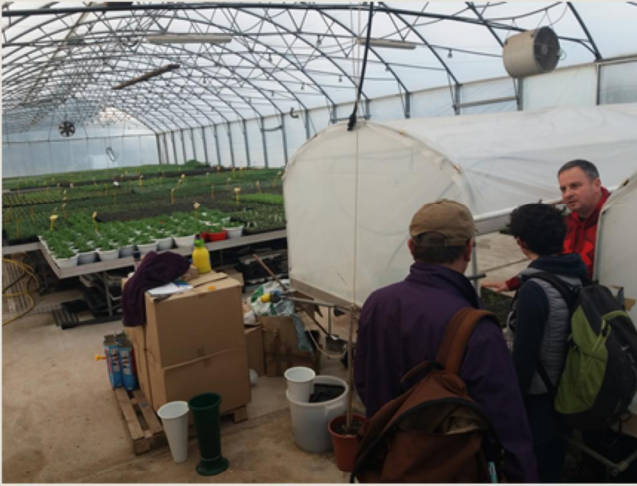
The policies and political driving forces



- Development strategies recognised tourism and competitive advantage of islands, so that even public resources are directed for such use (development of touristic resorts, infrastructural investments, etc.). On the other hands, even at political stance, importance of agriculture on islands is not sufficiently recognised so that uniform agricultural measures are not sufficiently adapted for island conditions (small parcels, mosaic agricultures, emphasis on preservation of stone walls and other agricultural heritages).
- There are various EU funding schemes which can be used for island development. LEADER program, and LAG-s on islands represent very important key for local development of islands.
- National and supranational institutions develop various types of certification programs which are suitable for promotion of local agricultural products. Thanks to Island act and efforts at national level, a particular certificate, Hrvatski otočni proizvod, is developed for products composed mainly of local ingredients.

Actors: local, regional and national government, UNDP, EU bodies, LAG-s and cooperatives, Paying Agency for Agriculture, Fisheries and Rural Development, and Advisory Office for Agriculture (Poljoprivredna savjetodavna služba)

Resulting consequences on farming economy



- Due to market forces, agricultural island production which is competitive is transformed to large-scale, such as grape and medical plants.
- Otherwise, if not attractive for market production at large scale, agricultural land is abandoned. Moreover, due to depopulation there is no labour force to cultivate small inaccessible parcels.
- However, due to new consumer trends and policy efforts, islands are recognised as very important hotspots for eco-agriculture land is mostly preserved from pollution.

Resulting consequences on land-use and biodiversity



- transforming land use purpose from agriculture to touristic
- grassland decreases
- forest succession and forest fires continue due to missing of livestock to “clean” the terrain
- decrease of biodiversity



The HNV vision

Managing biodiversity landscapes for a vivid society

Photo credit: Pero Poljanić (Pelješac peninsula - Župsko field- mosaic agriculture)

Discover tradition

BRAČKI VITALAC

- a lamb or goat meat meal – a protected nonmaterial cultural heritage from island Brač.



Source: Jakšić, 2014:129



traditional wheat mill

usual equipment in traditional rural houses

Blaca, Brač (2014, source: LAG Brač)



Autohton local product

Inside of sweet shop Cukarin in Korčula (Source: LAG5, 2017)

Farming which keeps biodiversity, tradition and population



- HNV : local production inland sustain mosaic landscapes at a relatively wide scale, combining different productions with a share from grazing livestock. These systems are low input and are able to market their products. This goes along rebalancing tourism towards the inland.

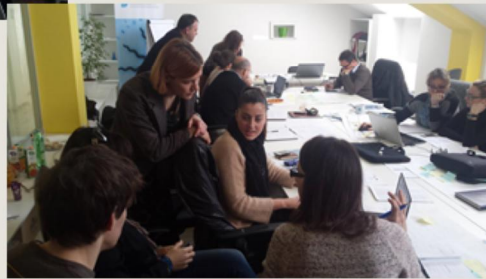
Biodiversity rich landscape in 2030



What does need to be addressed for the HNV vision?

Industries which are welcome on islands are those which can be embedded into natural and other values of islands, such as: food processing, stone processing and shipbuilding. Island development cannot be only the responsibility of local leaders but specific set of selective measures has to be developed at the national level (Filipić, 1985:119).

Who are the actors to get involved in the process? How?



BAU scenario

- Mass tourism
- seasonality
- „Apartmanisation“
- Stonewalls disappear
- Tradition lost
- Domestic animals rarely seen
- Seasonal workers in tourism, the places are empty in the winter
- Import-oriented islands
- Supermarkets

HNV scenario

- Agrotourism
- Tourism along the whole year
- Stonewalls rebuilt
- Tradition preserved and cleverly enhanced by new technologies
- Revitalization of karst pastures
- Young families chose settle down in Dalmatian islands
- Self sustained islands
- Local good markets (short supply chains)

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