

Presentation, analysis and evaluation of the situation of tourism in the Aegean Islands

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Forward

The first Sustainable Tourism Observatory in Europe opened in the Aegean Islands, the main archipelago of Greece, in early 2013, under the auspices of UNWTO. It is established by the University of the Aegean in collaboration with UNWTO. A first report was published in 2016 and here is the second report.

Even if we can consider the whole region as a sub-national destination at the national and the global level, every island considers itself as a distinct one. For sure, even if there is a lot of interference between the islands of the region (i.e common transport network, island hopping, common tourism marketing plan, common financial resources within the EU financial programs etc), there are also many disparities among them concerning the basic components of the Observatory as the supply and demand, the social and the environmental pressure, the impact of tourism to the destination.

Nevertheless we use also regional data for two main purposes:

- (a) for a significant number of variables there is not data at the island level. So we are obliged to use regional data (NUTS 2) or data at the level of department (NUTS 3)
- (b) for comparison reasons between different Greek regions in order to make obvious the spatial differentiations of tourism development

For all these reasons it is necessary to proceed to a presentation not only at the regional but also to the island level when the data allow it.

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1. The Methodology - The operational definition of sustainability for measuring the tourism performance and impacts¹

Tourism development, in itself, should not be the main goal of a destination. Successes in tourism development should not only be examined by the number of tourist beds and visits to the area - even though these are important indicators - but by its impact on the economic welfare of the host population. This welfare is based on the performance of tourism activities, tourism expenditure, and employment generated in the area. According to conventional economics, the direct effects of tourism, as in any other sector, on GDP and total employment of an area, are the basic indicators for the evaluation of a destination's level of development.

The worldwide emergence of the term “sustainable development”, as a framework for the assessment of human welfare (social and environmental), leads to two critical changes to the existing approach:

- Firstly, the assessment of impacts due to any tourism activity cannot be based solely on the estimation of its impacts on the area's economic development but also on its contribution to social and environmental development and conservation efforts.
- Secondly, the assessment must not only consider short term effectiveness (e.g. annual increase of the product and the employment), but focus on long-term prospects. This will help ensure better conditions of development for future generations, in generating not only and but also natural and social capital.

But how can someone measure and evaluate tourism performance and link it to the sustainable development of a destination? Within the proposed approach (Annex 1 - Figure 1) and based on an extended version of Driving force Pressure State Impact and Response (DPSIR) approach², tourism activity is presumed as a **driving force** that has to first be described in terms of supply and demand in order to have a clear understanding of it. The second step is to consider and measure its **results** and **performance** within the three pillars of sustainability, in order to evaluate its footprint. Thirdly, the estimation should be focused on the changes that tourism footprint results in the “Sustainability **State**” of the destination. Finally, **policy** measures need to be described and assessed based on their efficiency to resolve issues in order to ameliorate tourism performance and impacts on the destination. Then, new measures can be proposed.

A more analytical presentation of the used approach is presented at the Annex 1.

¹ Based on the report I. Spilanis, J. Le Tellier “Towards an observatory and a quality label of tourism sustainability in the Mediterranean”, Plan Bleu, UNEP/MAP Regional Activity Center, June 2012.

² <https://www.eea.europa.eu/publications/TEC25>

2. The Destination

The Aegean Islands (Map 1) are composed of two NUTS 2³ EU regions, the Region of Notio Aigaio (RNA) and the Region of Vorio Aigaio (RVA), out of the 13 regions composing Greece. The first has in 2019 an estimated population of 344.027 inhabitants (in comparison with 308.975 in 2011 –census data) living on 5.316,15 sq.km. and the latter has 211.098 inhabitants (199.231 in 2011) living on 3.839,2 sq.km. The RNA is composed of two geographical ex-NUTS 3 areas: Kyklades is composed of 24 inhabited islands and has an administrative status (LAU 1 or 2) and 9 newly created NUTS 3 zones and Dodecanissos is composed of 15 inhabited islands and 4 NUTS3 zones. The RVA is composed of three ex-NUTS 3 areas: Lesvos (with 2 NUTS3 zones, Samos (2 zones) and Chios, all of which have 3 islands each. In the Appendix 1 – table 1⁴, there is a complete list of the islands, their population and their surface.

In the Aegean Sea is located also a number of coastal islands that are part of continental regions and are not included in the study.

3. The Tourism activity: Supply and demand

3.1. Supply

The number of beds determines the capacity of tourism in a destination. They fall into three categories: the beds in hotel accommodations and camp sites (main accommodation), beds in non-main accommodation (bed and breakfast, villas, apartments etc) and the private homes; the two first categories are classified as professional accommodation and the latter as non-professional.

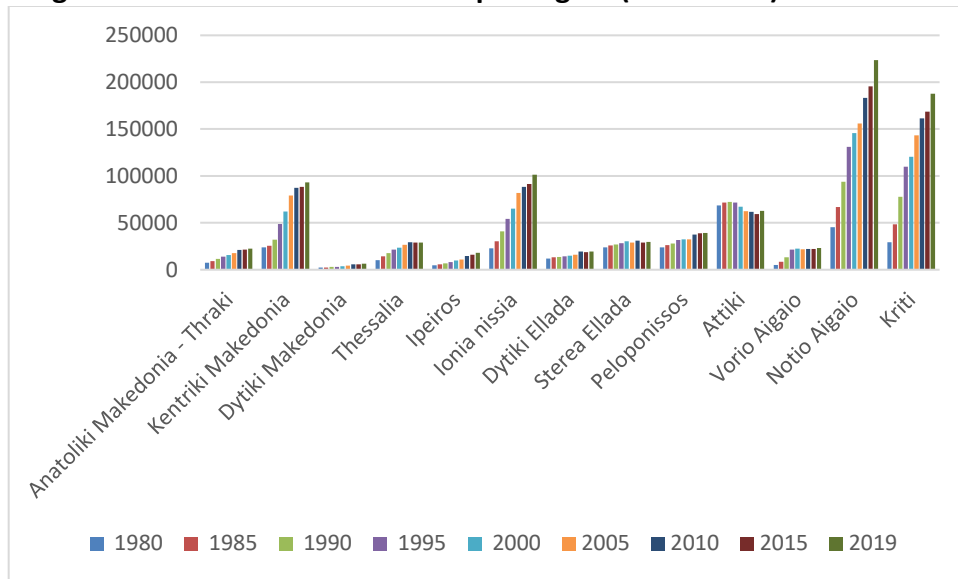
66,1% of available **hotel beds** at the national level are concentrated in the Greek islands⁵ at 2019 (565.950 of 856.313 hotel beds in total compared to 512.033 of 765.715 for 2012)- an increase of 10,5% over 7 years. The RNA has 2.154 hotels with 223.691 beds, representing 39,5% of beds on islands and 26,1% of the national total. The RVA has only 387 hotels with 23.006 beds or 2,7% of the national total (Table 2).

³ Within the EU statistical system: NUTS= [Nomenclature of Territorial Units for Statistics](#), NUTS2 for regions and NUTS 3 for departments. LAU=[Local administrative unit](#)

⁴ The analytical data are in the appendix

⁵ Greece has 114 inhabitant islands; 80 of them have an administrative status; 39 of them are belonging to the RNA and 9 to the RVA. There are two more island regions with 14 islands (Region of Kriti with 2 islands and Region of Ionia Nissia with 12 islands); the rest of the islands belong to continental regions

Diagram 1: Evolution of hotel beds per region (1980-2019)



Source: ELSTAT, author's

The majority of the beds are concentrated to a few number of islands: Rodos has 99.031 beds (11,6% of the total compared to 16,6% in 2013 and 17,5% in 1999), Kos 55.465 (6,5%), Thira (14.986) and Mykonos (13.394) are the islands with more than 10.000 beds each, all in the RNA. In the RVA the island of Samos has 9.905 beds.

The majority of the islands recorded an increase of the number of commercial tourism beds that are especially large in small islands that have experienced tourism development since the 2000s as Koufonisi, Astypalea, Tilos, Lipsi and Kastelorizo (over 200%).

There is also a difference between the size and class of hotels between the islands. These parameters are highly correlated: the islands which recorded the largest size of units, observed to have higher classes of units. For example: Rodos - with 198 beds per unit - and Kos - with 196 beds per unit – exceeded the region and the countrywide size of 102,3 and 85,5 beds per unit respectively. In PVA the average is 59,5 beds per unit.

As for the accommodation of higher class (i.e. hotels with 4 or 5 stars), it was observed that the entire country has 417.994 beds or 49,2% of the total number of hotel beds compared to 39.8% in 2013. Islands with the highest number of high class beds occur in the Dodecanese – 113.304 beds (or 67,6% in 2019 compared to 57,7% in 2013 of all hotel beds in the RVA). Rodos and Kos, however, have the highest rates of high class hotels with 73,6% and 68,3% of the beds respectively . Cyclades also had an important number of high class units with 23.813 beds (42,5% compared to 29,8% in 2013) with Mykonos and Santorini at 67,5% and 55,3% respectively. In PVA the number of beds in high class hotels is only 23,6% and Chios, an island with very few hotel beds, has the higher score with 46,6%.

Regarding **camp sites**, they do not constitute a large part of the total accommodation capacity in Greece: exist only 297 units (80.000 locations), which is approximately 10% of total number of hotel beds in the country. Camp sites have had a record of continuous decline for 15 years. Of these 297 units, 85 with 21.300 locations (26.6% and 28.6% respectively of the national total) are located in 28 of the 80 islands of the country. The RNA has 33 (3 in Dodecanese and 30 in Cyclades - a traditional destination of free camping in the first phase of tourism development in Greece) with 9.056 locations (8.860 in Cyclades) which constitute 46% of the island camp sites, but only 11% of the country (289 and 81.549 respectively). Paros with 7 units and 1.974 locations is the island with the highest number camp sites. In the RVA there is now one camping in Lemnos.

Concerning the **non-main accommodation** (rooms and apartments to let), there is less data available, although they constitute a large part of the total available number of commercial beds in the country. Based on the data of the Confederation of Entrepreneurs of Tourist Accommodation Greece Apartments (SEEDDE), the official number of available beds for 2019 was 435039 (an approximated figure as methods for recording and modes of licensing are limited). Of these available beds, 252.072, or 68,9%, are on islands: the RNA has 6.317 units with 144.869 beds (31.018 beds in Dodecanese, and 113851 beds in the Cyclades), which constitute about 33% of the available relevant facilities in Greece for 2013. The RVA has a total of 15.719 beds. At the island level Santorini has 25.718 beds, Rodos has 16.121 beds and Paros has 16.924 beds - which constitute the highest numbers of beds per island in the RNA. In the RVA, Lesvos island has the higher number of beds: 5.742.

The above analysis shows the approximate number of commercial tourist accommodation (Map 2). Beds in **private houses** (holiday dwellings, rented dwellings but also houses of relatives and friends' houses) should also be analyzed. Private houses are traditionally used by domestic tourists but more and more are being used by international tourists as either they have bought one, or they hire them instead of going to a hotel. The assessment of these categories of beds is based on the housing inventory, and mainly concern "vacant homes" which covers both "holiday" and "under lease" houses. Based on the data from the 2010 census, there is a significant increase in both total and vacant homes on the islands, creating a housing stock for tourist use of 519.440 units compared to 354.795 in the year 2000 as their number has increased much quicker than the population. Based on a realistic assumption that every house has on average 3 beds, the total number of beds in private homes are estimated at about 1,5 million additional beds. A small portion of these homes (approximately 20.000) as of 2014 now have authorization as tourist villas or houses, and act as legitimate businesses.

From the total number of private beds almost 1/3 is located in the Aegean Islands: 203.703 in Kyklades, 136.167 in Dodekanissos in the RNA and 214.919 in the RVA. Nisyros (1,52 dwellings per inhabitant), Serifos (1,47), Kythnos (1,43), Anafi (1,24)

and Kea (1,12) are the islands with the higher number of empty dwellings in relation to the resident population.

The age of the building is also an indication about the pressure of tourism. There are islands where the number of the buildings that have been constructed after 1980 is higher than that national average (41,65%): in Antiparos is 77%, in Paros 66%, in Mykonos 61%, in Kos and Naxos 60%.

Based on data of available beds, we can classify the islands in 3 categories:

- The **"hotel" islands**: islands where the number of hotel beds is higher from the other categories and are the main, organized, tourism islands such as eg. Kos, Rodos, Karpathos, Samos.
- The **islands «room to let»**: islands with a large number of complementary accommodation in relation to the total commercial beds. Generally, these are middle and small or non-tourist islands (eg. Kimolos, Iraklia, Sikinos, Kythnos, Anafi) but also some popular tourist islands such as Paros and Thira.
- The **"holiday" islands**: islands with a larger number of private-holiday homes than professional ones. It concerns many categories of islands: those that are close to the capital mainly in Kyklades considered as "attractive" for development as secondary housing for private use, and those with high rates of emigration over the past few decades. As a result, there are many empty houses, sometimes more than the occupied ones, used as holiday homes nowadays.

The increase in supply and demand of such accommodation is reflected in (Table 2):

- **The indicator "tourist beds / inhabitant"**: indicates the maximum pressure on the resident population from "foreigners" - short-stay, Greeks and international tourists - when all the beds are full, i.e. in the high season. PNA is the region with the highest average (1,08) at the national level and PVA one of the lowest with 0,19. For 24 islands, this ratio has exceeded the ratio 1:1 (one bed per inhabitant) with greater pressure exerted on Koufonissi (3,55), followed by tourist islands of medium and small size such as Mykonos (3,29), Santorini (2,96), Ios (2,81), Iraklia (2,59) Antiparos (2,56), Folegandros (2,34) and Sifnos (2,21) which exceed the ratio 2:1. The limit of 1:1 is not overpassed by the big tourist islands as they have the infrastructure due to their larger resident populations (Map 3).

If we added holiday beds to the tourist beds, then only three islands remain below the ratio of 1:1 and 15 Islands record more than 4:1 beds compared to their population.

- **The indicator "tourist beds / area (surface)"**: indicates the maximum pressure on the environment both by permanent constructions created to meet the needs of tourists, but also the consumption of resources in combination with the production of waste generated by tourists. Of course it should be stressed that this environmental pressure adds to the pressure coming from the residents which provides the following data:

- The "tourist density" is particularly high in 3 islands where there are more than 200 beds per sq.km: Santorini with 537, Mykonos with 349 and Koufonissi with

248. Two other tourist islands (Kos and Paros) exceed 100 beds per sq.km (Map 4).

- When at the “tourist density” we add the density created by the holidaymakers (secondary houses), the number of islands with a density of more than 100 beds per sq.km is 22 with Santorini reaching 848 beds per sq.km and another 3 islands (Mykonos, Syros, Koufonissi) exceeding 300 beds per sq.km.
- Finally when we accumulate the pressure coming from the residents, Santorini on to the above pressures, it adds to 1029 beds/sq.km. having a density of construction making it to look like more to a big city than to an island; Syros has 617 beds/sq.km, Mykonos 657, and only 17 out 48 islands have a bulk density below 100 people per sq.km.

Of course, the density can increase more within a day due to tourists who do not stay on the island, but who are visiting through marine tourism (cruise ships and yachts) or through day trips. Santorini is an extreme example with 980.771 visitors anchored to the island in 2019 and it often happens to welcome more than 10.000 cruise visitors in one day⁶. Mykonos and Rodos are also hot spots for cruise ships that are berthing in 787.490 and 308.194 respectively.

Nisyros, Symi and Antiparos located closed to the highly developed islands of Kos Rodos and Paros receive every day an important number of day trips that are increasing every year as the number speedboats is increasing. These two categories of tourists-visitors are creating an additional expenditure locally (it is estimate to be around 40 euros per capita for cruise visitors), but also a higher pressure as they have to be added to “normal” tourists creating overcrowding and negative experience⁷.

3.2 Demand⁸

The registration of arrivals and overnight stays of tourists used to come only from hotels and camp sites; only recently data are collected by survey, unfortunately only on the regional level, from the complementary accommodation. Using these data in combination with data from the surveys of incoming tourism and vacation survey of resident tourists, we have proceed to the evaluation of night spent per region that gives in PNA 63,4 million and only 4,6 million in PVA.

⁶ Actually there is a joined effort between the local authority, the boatmen and the cruise companies in order to regulate the arrivals in order to limit the number of cruise tourists under the limit of 8.000 people at the same time.

⁷ Cappato A., 2001, Cruises and Recreational Boating in the Mediterranean, Plan Bleu UNEP/MAP Regional Activity Centre

⁸ Main data concerning demand parameters as arrivals by air and sea, arrivals and nights spent in hotels per island are provided at the table 3

Table 1: Estimation of night spent of foreigners and national tourists and equivalent population per region (2019)

Region	foreigners	Nationals	Total	equivqlent population	estimation of population 2019	% equivalent /resident population
Attiki	34.028,0	7064389	41092418	112582	3.742.235	3,01
Voreio Aigaio	2.902,1	1683016	4585089	12562	221.098	5,68
Notio Aigaio	53.168,7	10211693	63380346	173645	344.027	50,47
Kriti	43.256,2	3612986	46869156	128409	634.93	20,22
Anatoliki Makedonia & Thraki	10.170,6	2195834	12366391	33881	599.723	5,65
Kendriki Makedonia	40.808,3	7225348	48033641	131599	1.873.777	7,02
Dytiki Makedonia	1.519,7	691648	2211347	6058	267.008	2,27
Ipeiros	4.002,5	2759113	6761637	18525	333.696	5,55
Thessalia	4.888,7	4160085	9048739	24791	718.64	3,45
Ionia nissia	23.744,4	2698607	26443013	72447	203.869	35,54
Dytiki Ellada	4.530,4	2391165	6921585	18963	655.189	2,89
Stereia ellada	2.978,0	3473622	6451587	17676	555.96	3,18
Peloponissos	6.466,3	5483026	11949280	32738	574.447	5,70
Ellada	232.463,7	53650531	2.86E+08	783875	10.724.599	7,31

Source: ELSTAT, BoG,

Based on the estimation of total night spent, the number of “equivalent population”⁹ is calculated. PNA is again on the top of the list as its population is growing by 50% during the year, showing one more time the importance of tourism activity for its economy, its society but also its environment.

Turks, British and Americans are the main nationalities in the PVA. The latter are mainly greek immigrants and use to stay for a longer period than ordinary tourists. Turks are staying very few days, mainly the week-end, or they are effectuating daily trips. In the PNA all the main nationalities coming in Greece are present and their length of stay is higher than the national average. Tourists from Russia are staying longer than other nationalities.

⁹ The equivalent population is calculated by the division of the total number of night spent by 365.

Table 2: Arrivals, nights spent and average stay per nationality in PVA and PNA (2019)

	Arrivals				Nights spent				average stay			
	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019
PVA	328.1	364.3	388.9	359.3	2,458.2	3,217.2	3,113.2	2,902.1	7.5	8.8	8.0	8.1
Turkey	143.4	139.2	113.4	118.6	550.8	456.6	360.0	444.6	3.8	3.3	3.2	3.7
UK	43.9	66.6	71.3	58.9	392.2	789.3	782.3	595.8	8.9	11.9	11.0	10.1
USA	23.4	33.0	34.0	24.1	278.2	643.9	445.6	299.1	11.9	19.5	13.1	12.4
Germany	17.7	16.2	25.6	21.2	201.3	161.4	231.7	183.5	11.4	10.0	9.1	8.7
PNA	5,226.5	5,840.9	6,629.4	6,893.4	39,996.1	46,210.0	51,084.2	53,168.7	7.7	7.9	7.7	7.7
Germany	798.7	911.4	1,106.1	1,176.3	6,511.9	7,789.9	9,519.8	10,295.0	8.2	8.5	8.6	8.8
UK	671.8	706.0	666.0	861.6	5,411.1	5,879.4	5,409.5	7,015.2	8.1	8.3	8.1	8.1
France	421.6	486.0	431.5	426.5	3,356.3	3,877.7	3,564.0	3,369.8	8.0	8.0	8.3	7.9
USA	357.5	398.3	555.1	627.5	2,358.0	2,681.8	3,423.1	3,954.9	6.6	6.7	6.2	6.3
Italia	488.3	473.8	538.4	504.0	3,796.1	3,779.1	4,178.2	3,960.3	7.8	8.0	7.8	7.9
Holland	213.1	309.5	317.7	220.5	1,931.4	2,707.8	2,731.3	1,795.0	9.1	8.7	8.6	8.1
Russia	176.5	176.9	188.6	174.8	1,450.9	1,674.4	1,716.0	1,600.1	8.2	9.5	9.1	9.2
Poland	220.7	195.4	319.7	211.5	1,770.3	1,482.7	2,264.4	1,568.3	8.0	7.6	7.1	7.4

Source: Bank of Greece

Some general remarks based on data concerning arrivals at hotels for the different islands:

- **Unequal distribution** of arrivals and overnights between islands following the allocation of beds, professional and non-professional.
- **High seasonality**: in the vast majority of the islands, there is over 75% of overnights –and in many cases, over 90%- which are concentrated between the months of June and September.
- The **occupancy rate** of hotels: it was diminishing from 2008 (56,7%) till 2012 (43,2%) but despite the rapid growth of arrivals since then the occupancy rate is still low (48,7% for 2019). All the island regions have an average of stay higher than the national one (PNA 57,7%, Ionia nissia 57,3% Kriti 57,2%) , except PVA (35%).
- The **distinction of islands to those of the 'foreigners' and those of the Greeks**: with few exceptions major tourist islands (Rodos, Kos, Samos, Mykonos, Santorini) are dominated by international tourists. The number of overnights spent by residents in hotels is around 10% of the total. Of course, in reality, this “primacy” of foreigner tourists is less important if we take into account not only the nights spent in hotels but also those spent in to non-principal accommodation and holiday homes (for which there is no information) used mainly by Greeks.

- The **Average Length of Stay**¹⁰ (Map 5):

- Is much higher for foreigners (6.7 days on average) than for Greeks (3.2)
- Is higher during the peak season
- Is higher on islands characterized by mass 3S tourism and international tourists travelling on organized flights and staying for a week in the same establishment (and island). Examples include: Rodos, Kos, Samos, Karpathos, etc. However, this is not the case on islands such as Mykonos, Paros, Santorini and other Cycladic islands, where visitors stay on average 3 up to 4 days on the same island and visit one or two more islands.
- The **Average Length of Travel** of foreigners is decreasing from 9,6 days in 2008, at 8,9 in 2011 and only 6,3 in 2019. All the islands have a better performance than the national average.
- **Seasonality:** as we previously mentioned is high in Greece with 68,4% of overnight stays in hotels are taking place from June to September: the foreigners perform 72% and the locals 48,9% as they have different motifs for travelling. Ionia Nissia had 79,0% of nights during this period, PVA 77,0%, RNA 73,5%, and Kriti 71,3%. Between the other important destinations, the Region of Attiki has, as it includes the capital city, a very good dispersion of tourism all around the year scoring only 45,1% for the four months.

4. The results of the tourism activity at the Aegean islands

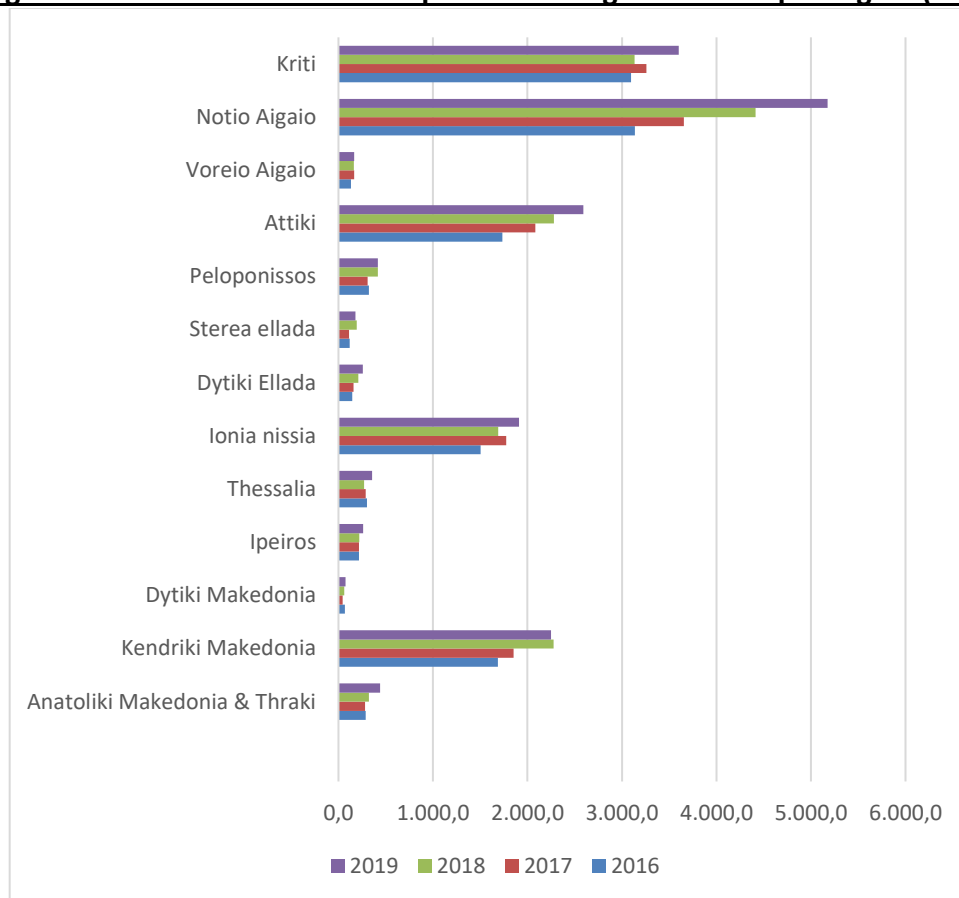
4.1 Economic results: tourism expenditure

Information on the performance of tourism activities including, overnight stays, arrivals and accommodations used, are mostly derived from the border survey of the Bank of Greece. However, **this information applies only to international tourists** based on the frontiers survey of the Bank of Greece.

The total expenditure of foreigners per region is highly correlated to the distribution of nights spent. The image of “two tourist Greece” is confirmed with five regions (three insular and two on the mainland) covering 87,8% of the receipts, while they have 75% of the professional beds. PNA is the leader in this group with a very strong progress during the last years; PVA has a marginal role to this with only 0,93% of the total receipts.

¹⁰ The Average Length of Stay calculated using data from hotels, is different from the Average Length of Travel calculated on the base of the number of days for the overall stay independently the accommodation used.

Diagram 2 : Evolution of total receipts from foreigner tourists per region (2016-19)



Source: Bank of Greece

More data are necessary for an in depth analysis:

Table 3: Receipts, expenditure per travel and per night spent from foreigners (2016-19)

	total receipts				expenditure per travel				expenditure per night spent			
	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019
PVA	398.6	457.9	422.2	460.1	398.6	457.9	422.2	460.1	53.2	51.9	52.7	57.0
Turkey	32.3	35.8	29.0	24.7	225.2	257.3	255.4	207.9	58.6	78.4	80.5	55.4
UK	23.4	42.6	42.3	37.5	532.7	639.4	594.0	637.4	59.6	53.9	54.1	63.0
USA	17.3	27.9	19.8	6.8	738.3	846.5	580.4	280.4	62.1	43.3	44.3	22.6
Germany	10.1	9.4	13.3	11.1	572.5	579.2	521.7	526.3	50.4	58.2	57.6	60.7
PNA	3,136.1	3,653.5	4,414.1	5,174.8	600.0	625.5	665.8	750.7	78.4	79.1	86.4	97.3
Germany	469.8	606.4	831.1	994.0	588.2	665.4	751.4	845.0	72.1	77.8	87.3	96.6
UK	425.4	505.5	498.4	667.0	633.2	715.9	748.4	774.2	78.6	86.0	92.1	95.1
France	269.9	320.7	288.9	332.3	640.1	659.9	669.4	779.2	80.4	82.7	81.1	98.6
USA	267.2	310.0	383.5	501.7	747.6	778.1	690.9	799.5	113.3	115.6	112.0	126.8
Italia	249.5	239.6	339.3	383.5	511.1	505.7	630.2	760.8	65.7	63.4	81.2	96.8
Holland	121.7	193.5	208.2	140.9	571.0	625.4	655.3	639.3	63.0	71.5	76.2	78.5
Russia	111.5	87.8	132.2	134.4	631.8	496.6	701.0	769.1	76.8	52.5	77.1	84.0

Poland	109.5	58.3	167.4	128.5	496.1	298.5	523.4	607.4	61.9	39.3	73.9	81.9
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Source: Bank of Greece

- **Total tourism expenditure:** it follows the nights spent distribution; for RNA was €5,17 billion (29.2%) and for RVA was €0.165 billion (0.9%) for a national total of €17,68 billion. The tourism expenditure for Kriti Region came to 20.3% (€3,6 billion) and 10.8 % for RIN (€1,91 billion). It is important to notice that the three island regions total 65,2% of national tourist expenditure and that RNA was ranked in 1st place for tourist expenditures out of all the Greek regions for expenditures and overnights and RVA in the 12th.

- **Average expenditure per trip:** of international tourists in Greece is very low (482,5) in comparison with previous years: 653,3 € in 2013, 639,5€ in 2011 and 730 € in 2008; this is due mainly to the diminution of the trip duration. There are significant differences between regions: RNA has the highest efficiency per trip (750,7 €) nationwide, the Region of Kriti in 2nd with 681,0 €, the Region of Ionia Nissia with 627,1 € in 3rd and the Region of Vorio Aigaio with 460,1 € in 5th.

- **Per night expenditure:** at the national level, it has increased since 2010 from 68,6 € to 76,1€. However, this rate is still lower than in 2008 (76,3 €). RNA continues to be in the first place among all greek regions with 97,3€, Kriti with 83,2€ is in 2rd place, the Ionia Nissia with 80,5 € in 3rd place, and RVA with 57,0 € is in 9th place.

- High seasonality and low occupancy rate, but also the per night spent determines the **average revenue per room annually**. Kyklades had the better performance for 2017 with around 32.000€, Kriti with 22.500€, Dodecanese with 21.000, Ionian Islands with less than 15.000€ and PVA with less than 10.000€.

The data regarding domestic tourism unfortunately does not have a regional analysis. However, some non-comparable information should be added to that of international tourism, which was previously discussed in order to give a general idea:

- **Overnight stays:** For 2019 the total number of nights spent in Greece was 53,6 million¹¹ compared to 92M in 2006. About 25% of these overnights concern trips effectuated by sea or by air (the only ways to go to an island). Only 18% had used a professional accommodation (10% only a hotel in order to be registered).

- **Tourism expenditure:** According to the provisional Greek TSA for 2015 the expenditure of domestic tourists was almost 10% of the total tourism expenditure. It has to be underlined that since the pre-crisis period, when the domestic expenditure was almost 4MB€, the expenditure has diminished by more than 70% till 2015 and has increased slightly then.

- **Average daily expenditure:** it was quite high for those used a hotel (77,07€) or a complementary accommodation (56,12€), but low when a private house was used (14,79€ when a holiday home was used, 29,91€ in the case of a house of friends or relatives).

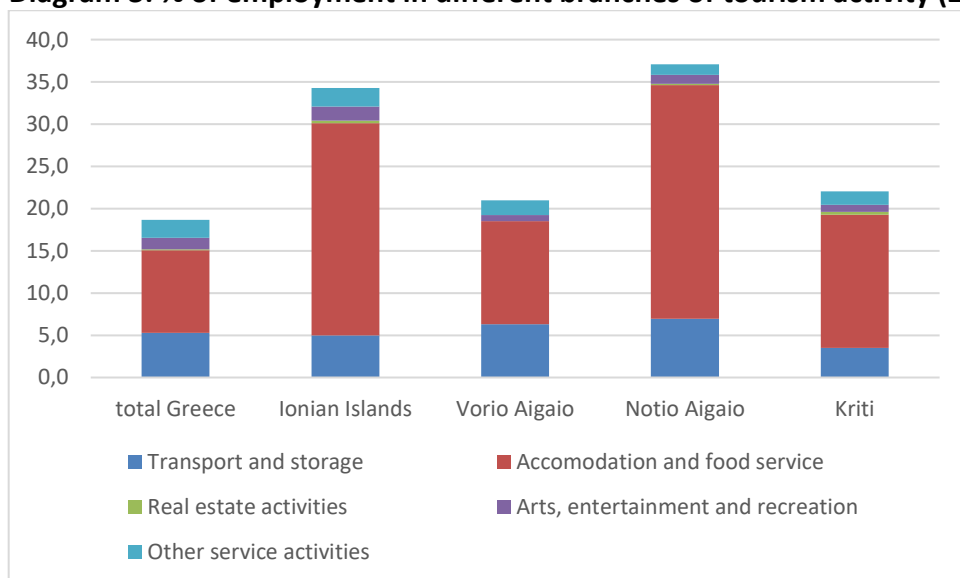
¹¹ Data from the survey for national tourism effectuated by the Greek Statistic Authority for EUROSTAT

4.2 Social Results: Employment

Due to the complexity of tourist activity, employment in tourism can be more difficult to approach. The high seasonality, the importance of family and undeclared work, but also the employment of foreigners non-residents of the country, make it more complex to measure.

Based on the Labour Force Survey, the important role of tourism in direct employment is confirmed: is 37,1% in PNA, 34,3% in Ionian Island, 22% in Kriti and only 14,7% in PVA when the national average is 18,7%. The branch of accommodation and food service is the most important.

Diagram 3: % of employment in different branches of tourism activity (2019)



Source: ELSTAT, Labour force Survey, author's calculations

The structure of employment is also different between highly (PNA, Kriti, Ionian Islands) and intermediate tourism regions (PVA, Attiki). In the first category, employment in accommodation sector is either higher or equal to food service sector. In the second category food service activities employ extremely more people. This implies that in these regions food service activities are used more by residents than by tourists.

The employment of women in tourism is higher generally than in other activities; in the accommodation branch women employment is even higher than men.

The age of employees is lower in tourism activity, fact that is more important in the food service branch.

Based on information from a former (2012-13) ITEP (Research Institute for Tourism) research:

- **The employment in hotels** is in proportion to the existing number of beds, which is highly influenced by the class of the unit (0,12 employees per bed for 1*star hotel and up to 0.62 employees for 5 star hotels during August) and the seasonality. The ITEP survey's estimation for employment to hotels across the country generated very low numbers of jobs: 121557 nationally (or 0,16 employees per bed for August), 29.644 for RNA (0,18) and 3012 for RVA (0,13).
- **The presence of female employees** is high in hotels and even higher when the unit is of a lower class and / or small. Female employment in lower class hotels is surpassing 70% of the total employment. This is most likely due to the majority of maintenance tasks being occupied by female employees. However, more male employment is also increasing in proportion to the size of the hotel as more services are added (restaurant, bar, pool, etc). In RNA, women occupy about 58% of jobs, ranging from 51% in 5 star hotels to 80% in 1 star accommodations, and from 70% in family units to 52,5% in hotels with more than 100 rooms. In the RVA, the average female employment is 61,1%, fluctuating between 58% to 81,5%, according to the class of hotel, and from 53,5% in family owned units to 67% in the small units (21-50 rooms).
- **The International employment** in hotels at the national level is relatively high, reaching 20% of the total number of employees. There is no specification if this number accounts for only permanent residents, or also seasonal workers that are arriving under different schemes, but, mainly, as low- paid students. The distribution by class and size of unit follows the same pattern as for female employees. We can, therefore, assume that most international employees may be women. Regarding international employment per region, in RNA their share is much higher than the average of the country (32,16% vs. 20.76%) - ranging from 27,64% in 5 star hotels to 54,47% in 1 star hotels. In RVA, the employment of international workers is much lower - less than half compared to RNA (15,92%).

4.3 Environmental results: land use, resources consumption and waste production

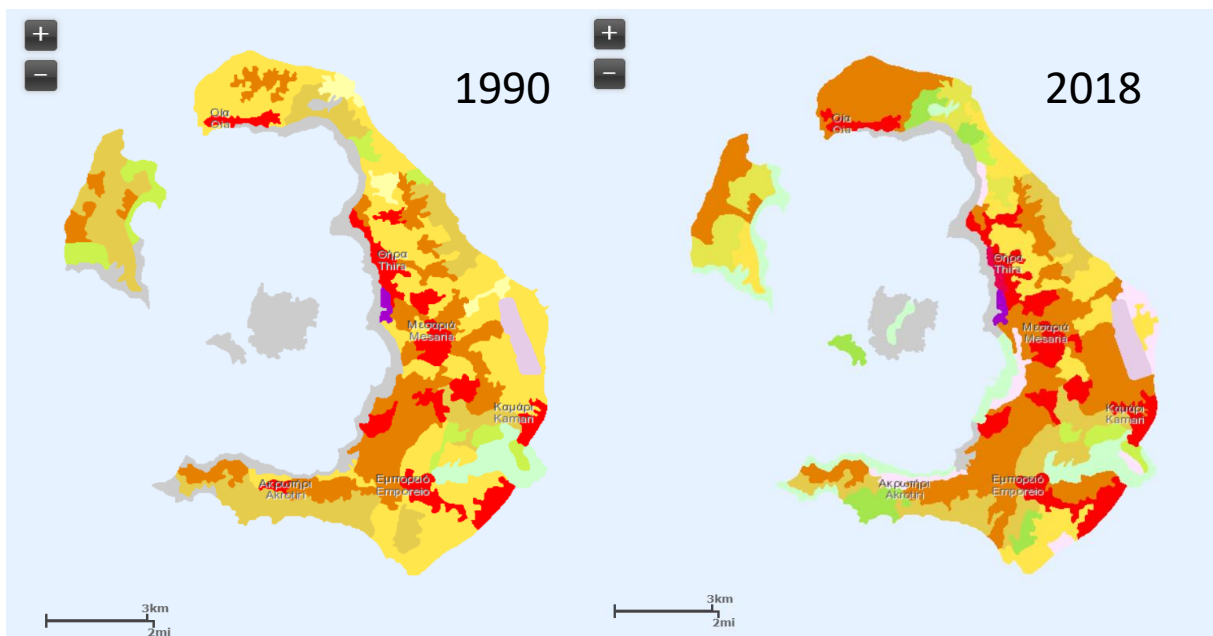
The environmental effects of tourism are two-fold:

- **Permanent**, which relates to changes in natural landscape and land use as a result of tourism development for: accommodation, marinas, convention centers, transportation networks, etc. It can significantly alter the environment for an immeasurable amount of time.

- **Periodical**, which concerns the operation of tourist facilities and depends on the number of tourists, as well as the consumption pattern of water or energy, and the production of waste, or even noise pollution.

Data on tourism infrastructural development is not available. However we can reasonably assume that, for the majority of the islands, infrastructural development has occurred since the 1970's, for which there have been direct, indirect and induced consequences. This is absolutely true for islands with a large number of tourist beds and holiday houses as well as for islands where tourism is monoactivity¹² (it concerns the majority of RNA islands). On other islands, such as Chios and Lesvos, where tourism is less developed, there may be less negative impact realized on the environment. Based on data from the European Environmental Agency for 2018 (Corine data base), RNA has 3,7% of its soil sealed and PVA only 1,89%. At the local level there are more extreme scores with Mykonos displayed the highest percentage of man-made infrastructure covering 23,3% of the total surface of the island. Santorini follows with 20,3%, Paros as well as Antiparos with 7,1% Kos with 6,1% , Rodos with 2,78%, and from the PVA Samos with 2,83%.

Map 1: Land use evolution in Santorini (1990-2018)



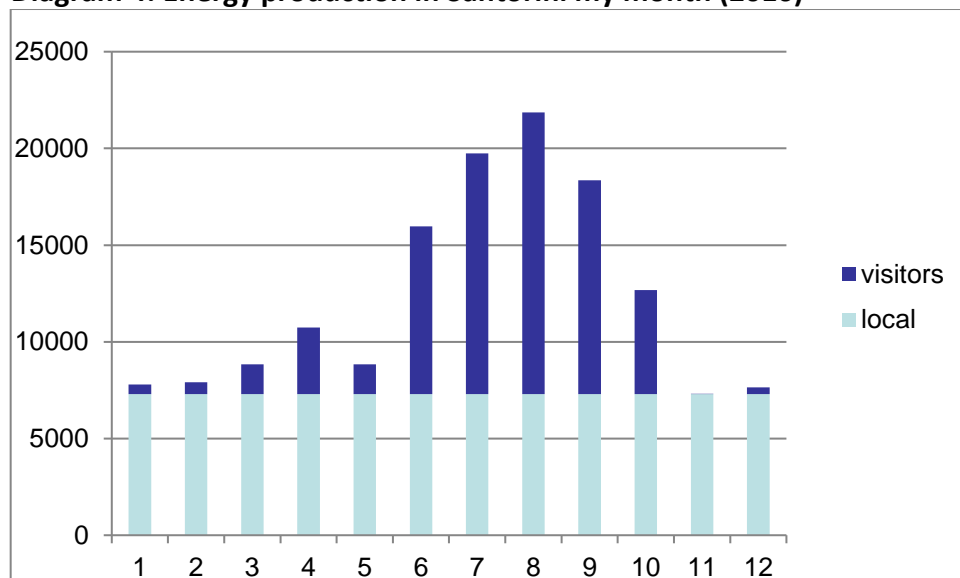
The role of secondary houses is important for this situation, as a bed in a private house occupies more space than a bed in a hotel room or a B&B (bed/m²) and it is used for a shorter period during the year (occupancy rate estimated at 8% or 30 days per year). However, their economic and social result is very low (low daily

¹² We can assume that in these islands, as there is development of other activities, all the new constructions are directly or indirectly related to tourism.

expenditure and very low direct employment). In the PNA 48% of buildings are constructed after 1980 and the ratio between tourism houses and annually occupied houses is 1:1,03; in RVA the figures are 30,8% and 0,98 witch means that a big part of the houses are old. Data at the island level shows that in islands as Paros, Mykonos and Kos the share of new houses is higher than 60%.

Unfortunately, there is no data for the consumption of resources, such as water and energy, nor for the production of solid and liquid wastes. There is also no data, for daily consumption and production, nor estimation about annual consumption and production. In a former study of the Aegean Observatory concerning Santorini based on the annual fluctuation of the electricity production, an estimation was done on electricity consumption per day: it was calculated that locals used to consume 17,1kwh/day when tourists consume 11,5.

Diagram 4: Energy production in Santorini my month (2016)



Source: DEDIE data, author's calculations

Therefore, no direct assessment of the environmental pressure can be derived without real data. Indirect estimates will be assessed based on the pressure indexes such as total beds / inhabitants and total beds / sq.km, as well as of the ratio between equivalent residents” and permanent population which have already been presented. As reported in PNA the later ratio is 50%, the higher among Greek regions, when for PVA is only 5,7%. Unfortunately with the existing data this indicator cannot be extract for every island.

5. The impact of tourism development to the destination's sustainability

Based on what has been reported previously, regarding the various degrees of tourism development between the two regions, and between islands in the same region, assessing the impacts of tourism to island destinations has to be divided into two levels:

- **Benchmarking between the two regions;** which mainly concerns the economic and social impact of tourism development. The environmental impact is related more to the specific characteristics of each island.
- **Grouping the islands** depending on their level of tourism development.

5.1 The impact of tourism development to the Aegean islands at the regional level

Regarding the overall progression of the **economy** of the RNA throughout the postwar period, it is obvious that it has been completely influenced by tourism development. However, this is not the case for RVA, even though in Samos, tourism activities have a significant impact. Based on the data on the added value per sector of ELSTAT (2017), the role of the sector of "Accommodation services and catering services" in the PNA is clearly reflected, since 29.4% of the Gross Value Added comes from it (31.0 % in the Dodecanese and 27.5% in the Cyclades); on the contrary in the North Aegean it was only 9% (8.1% in Lesbos, 6.2% in Chios and 14.8% in Samos). If we take into account the Ionian Region with 25.5% and Crete with 18.8% and compare it with the whole country (6.8%), we generally understand the importance of tourism in the island area.

If we add to the above the sectors of transport (12.2% in PNA, 6.3% in PVA against 7.0% in the whole country), those of arts and entertainment (3.9%, 3.6% and 4,1% respectively), of wholesale and retail trade (7.9%, 8.4% and 10.5% respectively), of real estate management (12.6%, 16.2% and 17.1% respectively) and of construction (3.6%, 3.1% and 2.3% respectively), we realize that tourism dominates the economy of PNA and has had a decisive impact on the growth of total and per capita GDP at high levels for the country (107,8 in 2018, compared to 107,4 in 2010). On the other hand, the GDP of PVA is 68.3% of the country in 2018 while it was 78.6% in 2010. In the latter, the economy is based more on the public sector from which 31.9% of the gross value compared to 14.0% in the PNA and 20.3% for the country as a whole.

This high specialization, while it has yielded significant economic benefits to the PNA, creates strong fragility in its economy that depends on a single activity that is sensitive to external factors such as security issues, climate change and today the pandemic. A second downside is that a large portion of tourism expenditure leaks

outside the islands both (a) for supplies of goods and services not produced on the islands due to this monoculture and despite increased demand for local products and (b) due to income leaks of non-permanent residents on the islands, Greeks and foreigners, who either operate or work on the islands.

Since 1951, the **demographic** evolution is entirely different between tourist and non-tourist islands and regions in general (Annex 3 - Table 4): Rodos -and the Dodecanese NUTS3 area as a whole- has the most diverse and positive demographics from all regions of the country. The population has doubled during the period of 1951 to 2011 (from 58.946 to 115.490 for Rodos). The birth rate, the average age of residents, and the immigration have increased. A similar development is recorded in the other tourist islands as Kos, Mykonos, Santorini and Paros. A careful analysis shows that a reversal of population development in the islands started from Rodos (since the 1950s), and extended to other islands in the 1980s when they began to have a significant rise in tourism activity. Hence, job opportunities and income increased halt emigration and attract new residents. Kos, Santorini, Mykonos, Paros, Antiparos and Ios, as well as Rodos, now have a more significant and young population than sixty years ago. The islands of RVA but also a part of islands of RNA have recorded a loss of population between 20 to 40% during the same period. The only exception is the small island of Fourni where the fishing activity has as positive impact on demographic results.

The only negative demographic data recorded in the PNA is the low level of training of human resources: only 10.99% of the population has a higher education diploma when the percentage of the country is 15.89% ranking it in the last place among the 13 regions. country. The Ionian Islands Region have a correspondingly low percentage, a fact that confirms the "blame" usually attributed to tourism for a low level of employee training, as we have already pointed out. This is particularly negative, as the low level of education inhibits the introduction of innovations in an activity that is in full transformation, such as tourism, which requires significant changes in all phases of the production process, the use of new technologies, the implementation of actions for the environment and in general the principles of sustainable development, its digital transformation, etc. In addition, it creates difficulties for professional mobility: people who have moved from the agricultural sector to tourism without general or special training, benefiting from the rapid growth of demand, cannot find another job when there is a problem in tourism. This is especially the case on islands with large tourism companies such as Rodos, where the crisis in tourism and the reduction of employment described earlier "translates" into unemployment and low wages, as the employees have no qualifications for a new job in another sector.

PVA maintains a better percentage of the population with a high level of education (12.4%) closer to the national average. Studies served as an "antidote" to the lack of employment locally, and often, educated people did not return to their home island.

In terms of the **environment**, an indicator that reflects the environmental pressure, especially in terms of biodiversity, is the soil’s fragmentation. Based on the data of the EEA, the PNA, despite the low population density, has a relatively high score, lower than that of the PIN, which combines high population and tourist density; the PVA records significantly lower human footprint.

Table 4: Regional fragmentation index (2009)

(GR) Greece		
Anatoliki Makedonia, Thraki (GR11)	1 359.95	0.74
Attiki (GR30)	75.45	13.25
Dytiki Ellada (GR23)	195.39	5.12
Dytiki Makedonia (GR13)	143.65	6.96
Ionia Nisia (GR22)	35.72	28.00
Ipeiros (GR21)	138.81	7.20
Kentriki Makedonia (GR12)	192.74	5.19
Kriti (GR43)	147.25	6.79
Notio Aigaio (GR42)	82.80	12.08
Peloponnisos (GR25)	140.47	7.12
Stereia Ellada (GR24)	277.94	3.60

5.2. The impact of tourism in the Aegean islands at the island level

The differentiated tourist development between the islands, which has already been presented, has different effects in terms of their socio-economic and environmental situation.

Information at the island level regarding their **economy** can only be given by employment per sector as data on GDP are not available at a level below the Prefecture. Total employment on all islands is, based on the 2011 census, 8.3% for the primary sector, 16.1% for the secondary sector and 75.6% for the tertiary sector with large differences between the islands (Annex 3 - Table 5) :

- 32 small and non-tourist islands have a level of employment in the primary sector higher than the national average. Lesbos is the largest of the islands with high employment in the primary sector: 18.1%. All tourist islands have a lower percentage, with Mykonos having the lowest (2.7%).
- 33 islands have a secondary sector higher than average due to the significant presence of the construction branch.
- In terms of the tertiary sector, the islands can be classified into 3 sub-categories, specifying their function:

- o The islands that have an important branch of "accommodation and catering". Only 3 of the 48 islands have a presence of the industry lower than the national average (7.8%), while 14 of them (the most tourist) have a percentage higher than 20% with Kos having the highest (36%); these islands have a clear tourism function.
- o The islands that have a significant presence of retail trade that is directly related to tourism, but also depends on the overall size of the population, having a mixed function
- o The islands that have an important public sector, simultaneously with the sectors of education, health, other private services as well as a significant presence of the army, having another main function than tourism.

Even if the above data provide information only for the permanent population and underestimate the total employment in tourism, which, because it is seasonality is provided by people who do not live permanently on the islands, they reflect the significant different impact from the tourism development between the islands as mentioned earlier.

The **labor market** (percentage of active population and unemployment) shows good results in two categories of islands:

- The highly and medium tourist islands (26 in number) recording a percentage of active population higher than 40%. If for Mykonos, Kos, Santorini, Ios, Rodos and Paros a high percentage of active population (employed and unemployed) is considered normal, high employment rate is less normal for small islands such as Koufonissi, Schinoussa, Heraklia, Halki, etc.
- The remaining 26 islands where the percentage of active population is less than 40% (the lowest is 24.1% in Kimolos) among which there are no tourist islands.

The dynamics of the population as reflected by the physical movement (births minus deaths) during the period 2011-19 show:

- 12 islands with a positive development. It mainly concerns tourist islands such as Rodos, Mykonos, Santorini, Paros, Naxos, Kos, Ios.
- 10 islands with negative natural development but at a lower rate than the national average (-1.7%)
- The largest number of islands (30) with negative physical movement greater than the national average.

Among the islands with high percentages of inhabitants under the age of 15, we find all the tourist islands, a fact that shows a population dynamism as confirmed by the natural movement of the population.

Finally, life expectancy in the two regions of the Aegean is higher than the national average: 82.2 for PVA and 81.9 for PNA when for the country it is 81.5 (OECD, 2020).

In terms of **the environment**, significant changes in the island economy (from low-income agriculture to the tourism economy) have led to a situation that can be described as follows:

- **Soil, landscape and biodiversity:** concerns the effects of land use change mainly due to increased construction and other human interventions in relation to tourism activity; they are leading to a reduction in the available natural areas of the islands, while at the same time increasing sharply their fragmentation. This development leads to the permanent loss of soil, the reduction of biodiversity, the loss of habitats and the degradation of the landscape.

As already mentioned, the islands that record a high percentage of sealed soil combined with a high percentage of fragmentation are the islands (as are Mykonos and Santorini) with the highest pressure in terms of their natural wealth at the peak of pressures due to the very high construction in and outside the settlements and their small size.

- **Energy management and air quality:** tourism requires energy consumption, both electric (produced on most islands by local units using fuel) and other fossil fuels mainly for transport (air, sea and land), but also other uses in companies that produce parts of the tourism product (eg restaurants). The increased electricity consumption during the high tourist season creates problems in the local networks due to non-interconnection of the islands with the mainland, while the development of local and individual solutions with RES has not produced much results beyond the extensive use of solar water heaters.

Although air quality in the islands is considered high, due to low population concentration, the lack of polluting and the presence of winds, according to a recent OECD study (OECD, 2020, Greece: Regional policy after 2020) both PNA and PVA report high presence of suspended particles PM2.5 ($\mu\text{g} / \text{m}^2$) 23.7 and 21.0 respectively, when the country average is 18.4 without specifying the causes.

Water availability, quality and management: the economic change on the islands (from low input agriculture to the tourism economy), in combination with the changes in rainfall and the high percentage of leakages in the water supply system, creates increasing problems to the quantity and the quality of drinking water. The quality of the water is also threatened by pollution coming from manufacturers without well performing sewage system (mainly of the agro-food sector as olive mills, dairies, abattoirs, wineries), livestock and agriculture holdings, mining activities, solid waste deposits and units of waste water treatment. Untreated waste water from settlements or isolated houses, leaks from landfills, etc. are also problems to consider.

The traditional ways for supplying water (wells and cisterns) is not possible to satisfy the new consumption patterns anymore even for the local population. Even drillings, that 30 years ago were the main source of supplying water, are now causing salinization problems as reported for a significant number of islands. The construction of open air water reservoirs and dams in 10 islands and of

desalination plants in 16 islands with 10 more under construction are the principal measures used to cope with the problem of accruing demand and diminishing supply from natural resources. The use of bottled mineral water that is transported from other areas of Greece, but also from abroad, is a common practice for international tourists but also more and more for Greeks who do not trust tap water.

This development is obviously a consequence of the increased water abstraction, but also of the reduction of water infiltration in the limited aquifer of the islands due to the reduction and erosion of natural areas, the destruction of terraces, the desertification, the degradation of wetlands etc.; all those phenomena accelerate the outflow of surface water into the sea. At the same time, the climate change that has already been recorded has led to a reduction in rainfall with a parallel increase in extreme weather events that reduce the enrichment of the aquifer.

The table below records the situation in two Aegean islands, Samos and Rodos, a fact that is not due solely to tourist traffic, as shown by the detailed table by island and watershed where water availability and extraction by category are recorded.

Table 5 : Annual infiltration and consumption in (a) Samos and (b) Rhodes

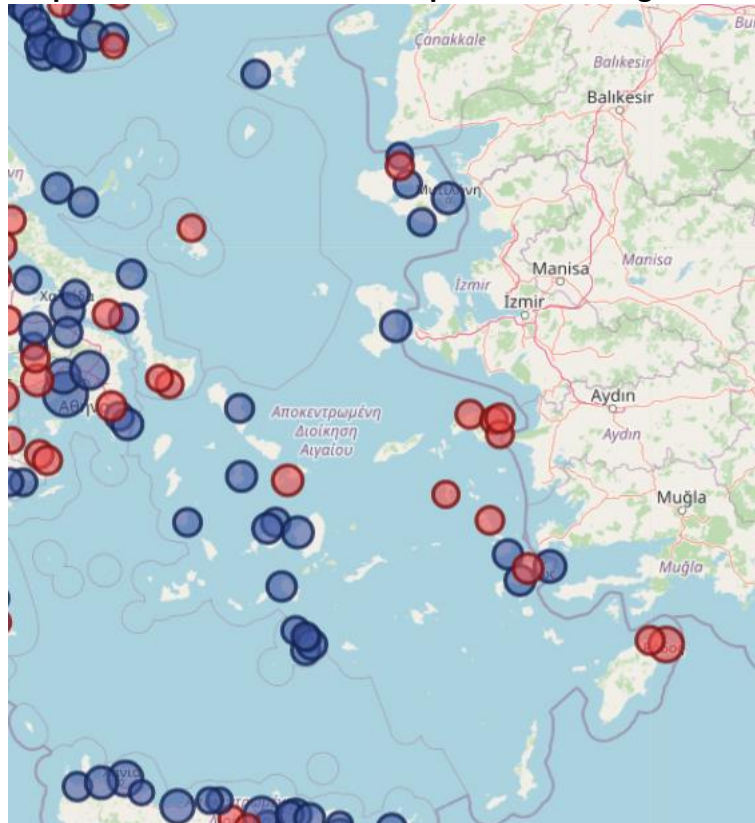
Cubic meters (10 ⁶ m ³) Aquifers of Samos	Average annual supply	Average annual consumption	Irrigation	Water Supply	Animal husbandry	Status
Kerketea (A and B)	15,66	0,34	0,20	0,15	0,00	Good locally bad
Idrousa - Marathokampos	5,09	1,73	1,36	0,37	0,01	Good
Karvouni	11,62	0,79	0,77	0,02	0,00	Good
Imvressou	4,08	0,65	0,54	0,10	0,00	Good
Vourlioton - Milon	4,53	0,80	0,29	0,51	0,00	Good
Mytilinion	8,14	2,06	1,43	0,63	0,01	Good
Kampos (A)	1,15	0,99	0,87	0,12	0,00	Good
Kampos (B)	0,34	0,34	0,34	0,00	0,00	Bad
Vathi	15,26	1,42	0,40	1,01	0,00	Good
Mesokampos	0,29	0,64	0,07	0,58	0,00	Bad
TOTAL (m³)	66,19	9,76	6,27	3,49	0,02	
TOTAL (%)	100,0	14,7	9,5	5,3	0,035	

Cubic meters (10 ⁶ m ³) Aquifers of Rhodes	Average annual supply	Average annual consumption	Irrigation	Water Supply	Animal husbandry	Status
North section of Rhodes (A)	34,98	15,18	6,37	8,73	0,08	Good
North section of Rhodes (B)	4,44	2,13	0,66	1,46	0,01	Good
Prophet Elia	3,91	0,01	0,01	0,00	0,00	Good
Epta pigon	6,06	2,32	1,22	1,10	0,01	Good
Kalathou – Gadoura	3,40	3,07	1,15	1,91	0,00	Good
Central Rhodes	63,09	6,51	5,16	1,32	0,02	Good
Attavirou	6,72	0,22	0,22	0,00	0,00	Good
Apolakkia	4,48	1,87	0,80	1,06	0,00	Good
Gennadiou	8,19	2,99	0,70	2,29	0,01	Good
TOTAL (10⁶ m³)	135,27	34,30	16,29	17,87	0,12	
TOTAL (%)	100,0	25,4	12,0	13,2	0,091	

Source A and B: First revision of the water basin management plan of the water department of the Aegean Islands (2017).
Data refers to various years and periods between 2012 and 2015 depending of the island and the aquifer.

Waste water management: There are plants on 19 islands covering parts of the permanent and seasonal population. Problems exist in relation to the operation of many of the units, mainly in the RVA. However, the quality data of the coastal water systems show that their chemical status is high, while their ecological status presents some, limited problems.

Map 2: Waste water treatment plants in the Aegean Islands



Source: Special Secretary of Water, Ministry of the Environment and Energy, Data base for monitoring waste water treatment plants

Quality of coastal sea water: There are 542 quality control points of bathing water on all islands. Despite the problems reported above concerning the management of waste water from settlements and different activities, no problems were reported. Instead the quality of coastal sea water is considered very good, as evidenced by the number of “blue flags”.

Solid waste management: Every region has a management plan elaborated by the regional authority in collaboration with the municipalities that reflects the principles and the goals of the national management plan. The actual plans, established in 2017, in order to be harmonized with the new national plan released on July 2015 and up-graded European legislation, included goals concerning biodegradable municipal waste, recycling (packaging materials, wheels, cars, inert waste, lubricants, oils, batteries, electronic material, etc.), hospital waste and restoration of old

landfills. An adaptation is now needed as a new national plan was elaborated during 2020.

Even if there is progress in shutting down and restoring the old landfills (in a few islands, the old landfills are still operational), less progress is made concerning the amount of waste that is rejected in the new and the old areas. This is because the actions concerning recycling and composting are lacking, mainly due to the inability of local authorities to organize such activities, mobilizing local people. Furthermore, the national operators in charge of picking up recycled material are not very active in the islands due to the significant additional financial costs involved in this process due to transport.

This delay in meeting commitments risks creating a double problem: the saturation of the new installations at a faster rate than planned; as the goals of reducing waste are not met plus the maintain of an inefficient process of waste collection. The delays observed have already led the European Commission to impose fines.

As described above there are different policies in order to deal with pressures created by the different economic activities and the population. In these policies, tourism generally is included as an additional population pressure based on an estimation of the supplementary people living on the islands for a short period of time.

The lack of policy for sustainable tourism at the regional and local level was also confirmed by the analysis of the tourism policies plans that are published and from the responses received from 18 mayors on the UNWTO questionnaire for tourism destinations¹³. Regions and Municipalities are concentrating their efforts for the marketing of the destination through typical actions as publishing promotion material, participation to tourism exhibitions, organizing field trips with journalists etc.

Instead, there are no actions concerning the management of the destination as described in the UNWTO questionnaire concerning actions as the implementation of destination strategy, the creation of destination management organization, the monitoring of tourism activity, the development of system for assessing and coping with seasonality, climate change, sustainability standards, safety and security, crisis management, economic monitoring, public participation, local awareness and education, attraction protection and site interpretation, visitor satisfaction, behavior and management, energy conservation, water quality and management, waste reduction, light and night pollution, low impact transportation etc.

¹³ Included in the UNWTO “Global Observatories of Sustainable Tourism: Program Operations and Management (draft), 7/2014

6. Conclusions – Propositions

6.1. Basic Outcomes and proposals for discussion with the stakeholders

The two regions they have a lot of similarities, as island regions, but also a lot differences; so they have to be treated separately:

- RNA has, as a whole, a very strong tourism development (high number of beds, high number of tourist arrivals, overnights and income, high percentage of GDP and employment provided by tourism) even if it is unequally distributed among the islands; in the contrary in RVA tourism activity is low and only Samos island records a significant development.
- The tourism product of the islands (and of the whole country) is mainly based on the 3S (sea, sand and sun) product (organized as a mass product in most of the principal destinations) which is under pressure from other competing destinations with lower production cost (mainly south and east Mediterranean but also over-seas destinations). This is principal reason for the reduction of receipts per tourist observed in the recent years (there is no long series of data at the regional level).
- The high seasonality of tourism due to the features to the tourism product which is related to the weather conditions and the increasing antagonism is leading to lower receipts per bed to the hotels that impacts important financial problems to them implying lower quality to the services offered by them.
- The increasing influence of every kind of intermediates in the tourism market, either the Tour Operators with the all Inclusive contracts that encourages tourists to stay in the hotels does not allow the diffusion of the beneficence of tourism development to the local economy or the reservation platforms and the low cost carriers, have a great impact on the outcomes of the activity .
- The insignificant part of tourism companies that are involved to different quality management projects, including environmental management. The latter is more important for the sustainable development of island destinations than continental areas, as their resources are limited and islands are characterized as environmentally vulnerable areas.
- The inexistence of integrated management plans on islands having as goal the sustainable development

6.2. Further steps in order to address problems

An important evolution that has influenced already tourism in some of the islands (mainly Lesbos, Chios, Samos, Kos and Leros) is the migration problem that during 2015 took an important dimension. The refugee crisis has particularly affected the arrivals of 2016, as several airlines have cut their flights mainly to the PVA islands.

There was a significant recovery in the following years, although the issue of refugees remains open.

The appearance of the pandemic in 2020 overturned everything we knew not only in tourism but also in our daily lives; therefore it is difficult to predict which trend is going to dominate the next day: the need for travel that seemed to have been consolidated on a global level or the fear of the presence of increased sanitary risk.

6.2.1. The creation of permanent structures and procedures in order to complete the lack of information necessary for decision making

The analysis till now is based on secondary data that are collected mainly from the Hellenic Statistic Authority (ELSTAT), the Bank of Greece (BoG) and other sources. These data have a lot of gaps concerning:

- the analysis of tourism activity related to the specificity of the place of tourism within the system of national accounts and mainly to the existing information on the regional and local level. Some information provided adhoc from surveys organized by different organizations cannot complete this gap.
- the fact that the national surveys for the inbound and domestic tourism don't produce till now enough data for the analysis on regional level as they have not been planned to provide this kind of information.
- there is no regional or local survey either to tourists or to stakeholders that could complete a lot of gaps concerning mainly the information on the complementary and the non-commercial accommodation, the characteristics, the consumption pattern and the level of satisfaction of tourists, the production pattern (including environmental information) and the satisfaction level of the local producers.

The above problems are related to the fact that there is no **national Tourism Observatory** and **Tourism Satellite Account** that could help filling the gap (a) by a closer collaboration with the bodies collecting information for their one purpose (ELSTAT, BoG, different Chambers) in order to produce the lacking information for the different spatial levels and (b) by doing surveys to tourists and entrepreneurs on a permanent basis in order to collect data that cannot be provided by other sources in collaboration with the regional/local structures

6.2.2. Ameliorating tourism governance by the creation of permanent structures and procedures for decision making involving stakeholders by the creation of DMO

Even if the existing information is incomplete, there is enough space to improve governance procedures necessary step for achieving the goals of sustainable development as described by UNWTO. The responses received by the tourism responsible of different destinations to the UNWTO Questionnaire proved that there

is an absence of management of the destinations in order to be sustainable. In most of the cases there is a Board for Tourism working almost exclusively for the marketing of the destination without any evaluation of the already undertaken actions, without a well-defined “tourism product” and with actions based on “ideas” of the participants and “experts”. The creation of a DMMO that will be used as the basis for the evaluation of situation of the and for further action concerning all the phases of production and promotion of tourism product, seem to be the best solution as international experience shows and UNWTO recommends

6.2.3 Amelioration of Tourism Policy Planning

As mentioned, till now policy making from regional and local authorities is almost absolutely concentrated to the marketing of the destinations and never to their management. In order to address the problems listed, our proposals are:

- The promotion of a quality label, i.e. "Aegean quality" in order to improve services provided from public and private sector. The goal of a “particular” scheme is to combine local cultural, environmental and production characteristics with the global principles of quality and sustainability for companies and destinations
- The shift from passive, massive, generic and low added value to active, qualitative, selective and high added value experience towards two directions:
 - the upgrading and enrichment of 3S leisure tourism in wellness tourism utilizing not only the sea water but also the hot and the sweet in combination with the utilization of the gastronomy, the culture and the nature capital of the different destinations
 - the development of special and alternative tourism products with a focus on experience tourism.

Annex 1: The Methodology

At the first level, tourism has to be considered as one of the driving forces for economic, social and environmental pressures for changes affecting the sustainability state of the destination area¹⁴. These changes depend on the intensity of the activity and on its level of performance that determines the tourist footprint. In the case of tourism the intensity can be measured by:

- the number, type and size of the tourist infrastructure (hotels, restaurants, spas, marinas, golf fields, conference centers, etc.) and other relevant infrastructure (roads, ports, airports, energy production, telecommunications, etc.), that satisfies tourism demand, and influences land use of the area. This infrastructure creates temporary economic output and employment at the destination
- the number of tourists visiting the area, which is measured by nights spent in the different types of accommodation available.

Absolute figures cannot give a clear image on the intensity of tourism activity independently of the size of the destination and its population; so different indicators have to be calculated (i.e beds or nights spent per sq.km and per inhabitant).

Tourists, in order to satisfy their needs:

- spend money for the purchase of goods and services such as accommodation, transport, recreation activities, commerce, banking and any other service that can be included in the tourism product,
- “use” human resources that are supplying these services, so they provoke new jobs. These jobs have different characteristics related with the gender of the employees, the duration of the employment, the qualification needed, the employee’s position in the enterprise etc,
- use natural resources (energy, water ...) and produce different kinds of waste.

These are direct effects that each tourist generates in an area, its footprint. Of course, all tourists do not have the same needs and the same behavior, so they do not produce the same outcome per capita. The sum of these outcomes constitutes the overall **performance** (total tourism footprint): the **result** of the tourism activity that depends, not only on the number of tourists, but also on their daily behavior. **The latter (per capita and per night spent performance) can be considered as the basic unit of measurement, facilitating spatial and temporal comparisons.**

Secondly, the economic, social and environmental direct effects (the overall result) of the economic activity have an impact on the destination:

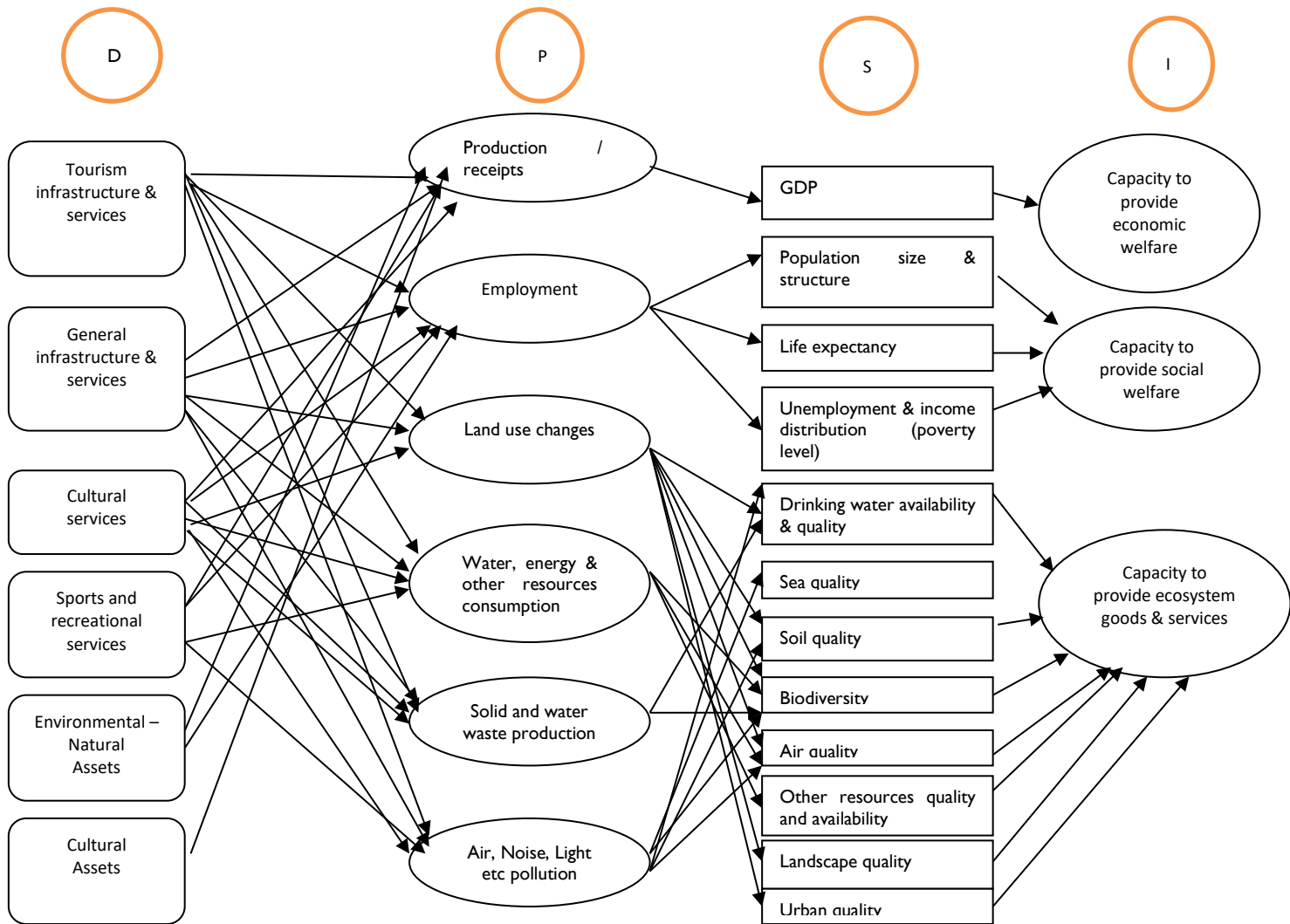
- Total tourism expenditure can generate a number of changes in the local economy, which can be measured by: the change in GDP; the induced and indirect demand for goods and services in other sectors; the emergence of new activities,

¹⁴ Agriculture, manufacture and population needs are other main driving forces.

and the decline of existing ones, directly or indirectly related to tourism; the diversification of private and public investment; etc. These changes are affecting the **economic efficiency** of the area and contribute to the long term economic welfare.

- Total, direct, tourism employment can also affect: the population structure of the area - the percentage of active and employed population, the percentage of female and youth employment, migration flows, the total income, the income distribution in the area, etc., which, in turn, affects the **social equity, the social welfare** of the area.

Figure 1. The Tourism Sustainability Assessment and Policy Approach



- Finally, tourism’s demand on the environment can affect the environmental health of the area and, more precisely, its **capacity to produce environmental goods and services** to the population. Such goods and services concern globally

human well-being as the provision of drinking water and sea food, absorption of wastes and UV radiation, pollination, erosion prevention etc but also affecting the tourism product as the aesthetic information, recreation, inspiration for culture and art, spiritual experience etc. The main concerns in assessing the environmental health of the area are the quality of sea water, the quantity and the quality of drinking water, the area's biodiversity, the quality of the soil, of the atmosphere, of the landscape, and of the urban environment.

However, if the results in two destinations are the same, the impact is probably going to be different on their respective economic, social and environmental structure as well as their carrying capacities. For instance, hotel capacity of i.e. 1000 beds creating employment of 500 people has a bigger socio-economic impact in a small city of 5.000 people than in a city of 1 million. The same is true for a daily water consumption of i.e. 25.000 litres; the impact would be higher in a desert area than in a place where rain is abundant and where there are large water reserves.

Based on the above analysis, when tourism has low economic, social and environmental performances, it is not sustainable. "Sustainable tourism" is tourism that can generate high economic, social and environmental benefits (measured as high expenditure and employment and low environmental consumption per night spent, consequently as high performance), contribute to higher welfare, and create long-term effectiveness of minimizing monetary and non-monetary costs and maximizing benefits at a destination. While this is an ideal state of the tourism activity, being able to fully meet these criteria is a major challenge for all destinations. Based on the ensuring literature, it can be argued that mass sand, sea and sun tourism –that is the most frequent type of tourism development on islands- is not sustainable because the economic profits for the host region tend to be low, while the negative social and environmental impacts are usually high. Any place in the system of axes - as a result of the effort to move away from the beginning of axes, either by the improvement of the 3S performance, or by its replacement by other tourist products having better performance - is preferable, since it improves the existing situation, while it moves towards a more desirable situation.¹⁵

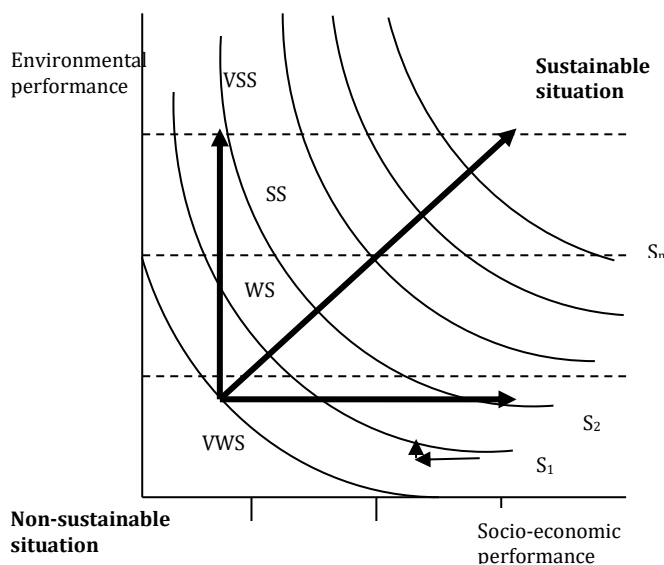
In the beginning of the axes of the Diagram 1 the situation is characterized by low level of welfare and is considered as a non-sustainable situation (since economic, social and environmental performances are low). Improvement is made as long as the region is removed from this point, by ameliorating its performances. When the improvement is focused exclusively on the economic performances (the movement is parallel to the horizontal axis), the region improves its economic sustainability, while it is also moving to a higher welfare level. Correspondingly, the improvement

¹⁵ At the beginning of the axes the socio-economic performance of tourism is low (low tourism expenditure per night spent and low employment per bed) and so is the environmental performance (high consumption of water, of energy and high production of waste per night spent)

of the social performances, leads to higher level of social welfare¹⁶. Finally the amelioration of the environmental situation in a destination that can be the result of the activity's greening is recorded on the diagram as a parallel movement to the vertical axis. If the improvement concerns, in a certain degree, all three dimensions, then the level of welfare is higher and the movement (diagonal to the axes) leads the region to a better sustainable level towards sustainable development (from curve S1 to the curve Sn); on the diagram this evolution is represented by a shift from the beginning of the axes on the diagonal.

Based at the figure 1 and the analysis preceded, the tourism performance could to be estimated on the per capita expenditure and the per bed employment concerning the socio-economic dimension; the environmental performance has to be estimated in a composite index based on i.e (a) the soil consumption per bed, (b) the water consumption, (c) the energy consumption and (d) the waste production per night spent.

Diagram 1: Evaluation of tourism sustainability

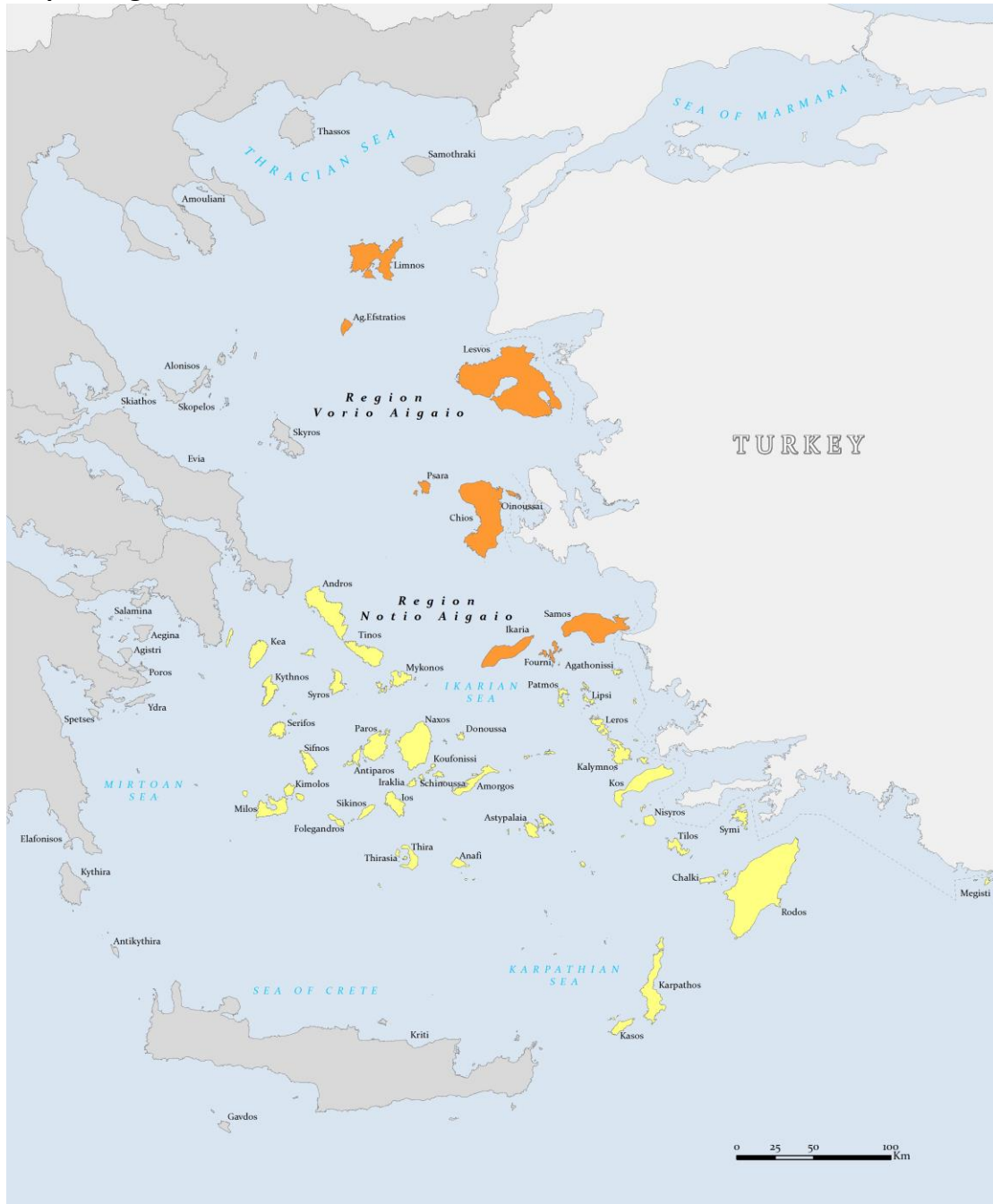


¹⁶ In order the figure and the various movements to be simpler the economic and social parameters are represented in the same axis.

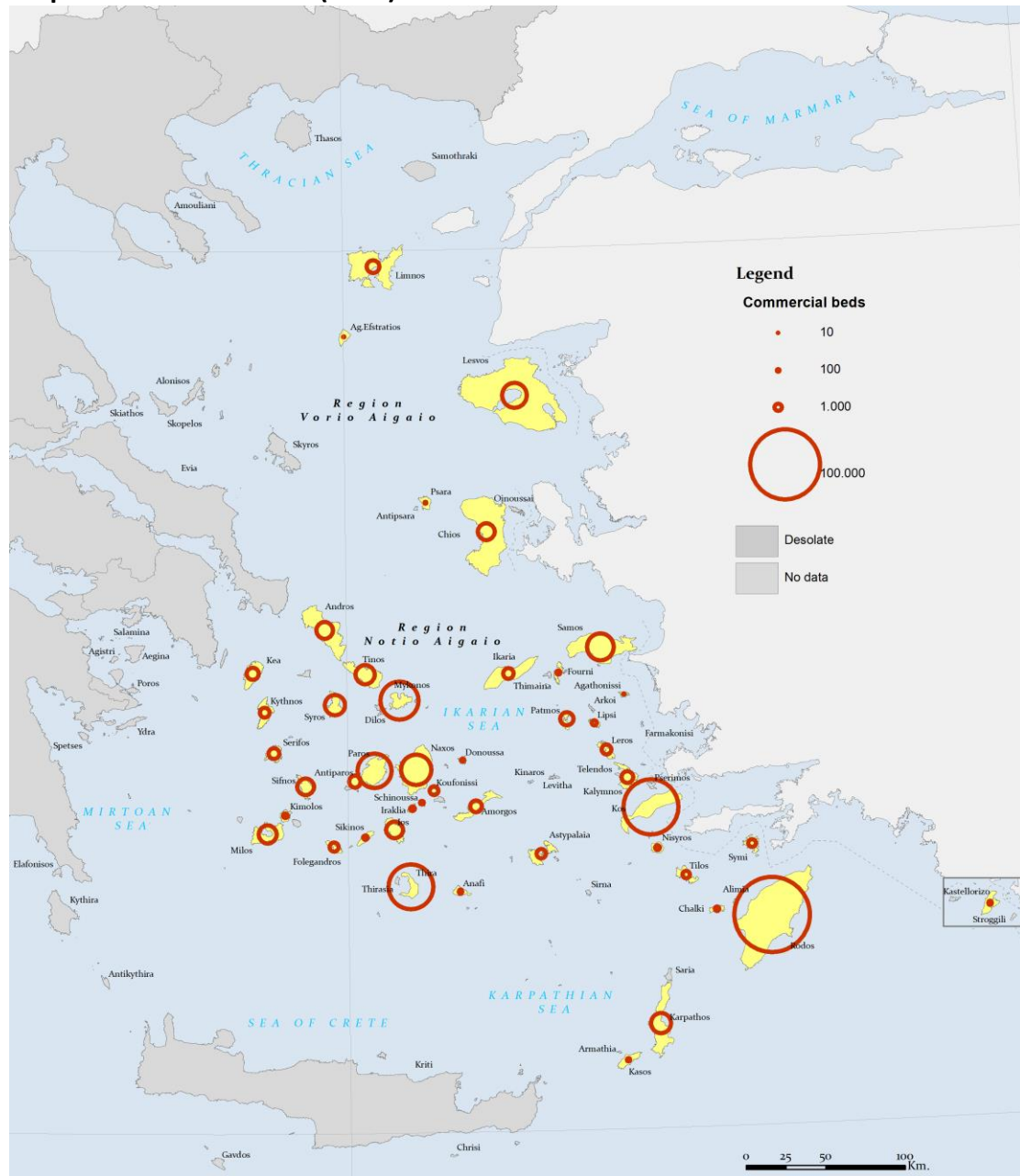
Annex 2: Maps

- Map 1: Aegean Islands. The RVA and the RNA
- Map 2: Commercial beds (2019)
- Map 3: Commercial beds/inhabitant (2019)
- Map 4: Commercial beds/sq.km (2019)
- Map 5: Average length of stay in hotels (2019)
- Map 6: Arrivals per inhabitant (2019)
- Map 7: Arrivals per sq2 (2019)

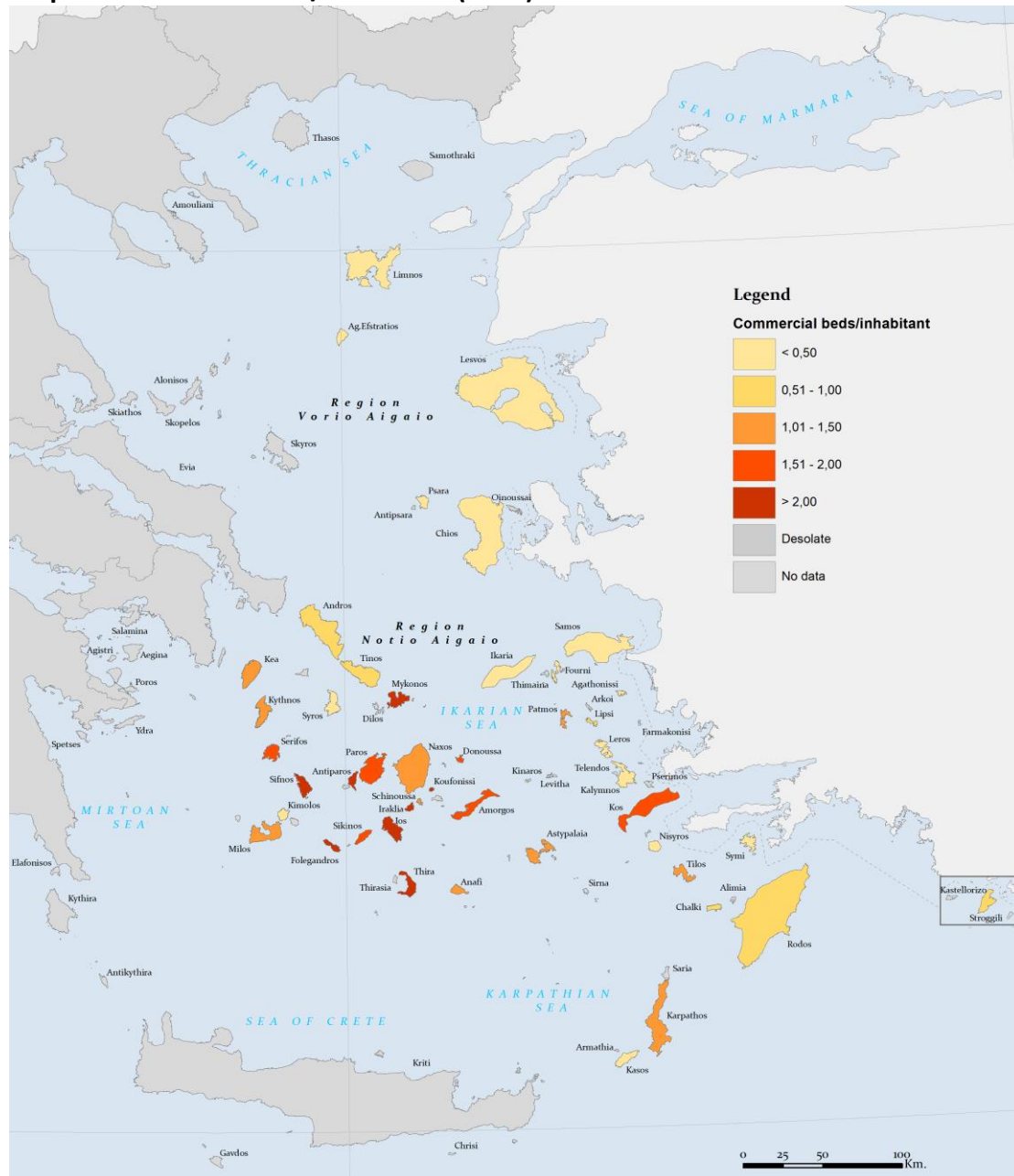
Map 1: Aegean Islands. The RVA and the RNA



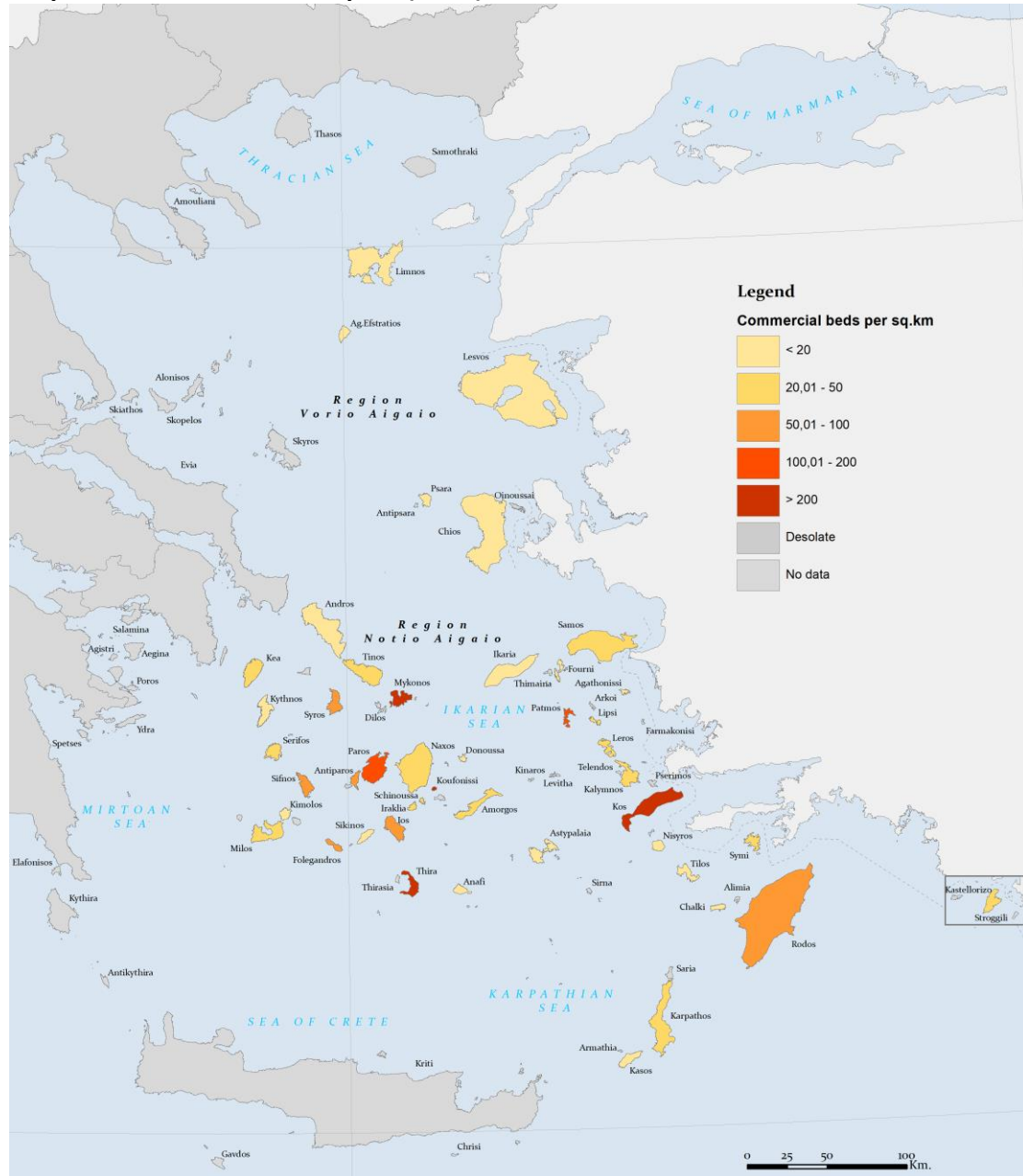
Map 2: Commercial beds (2019)



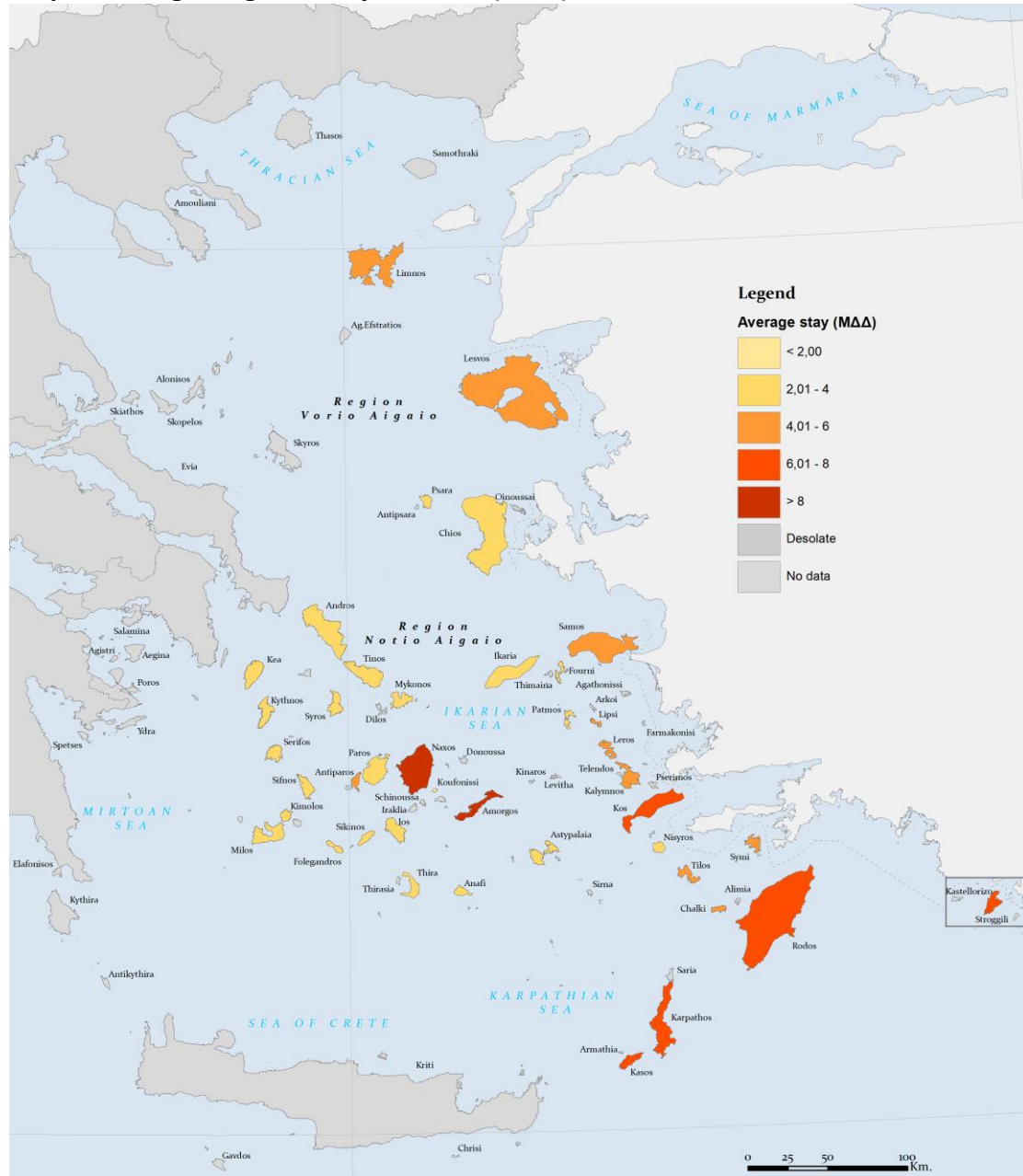
Map 3: Commercial beds/inhabitant (2019)



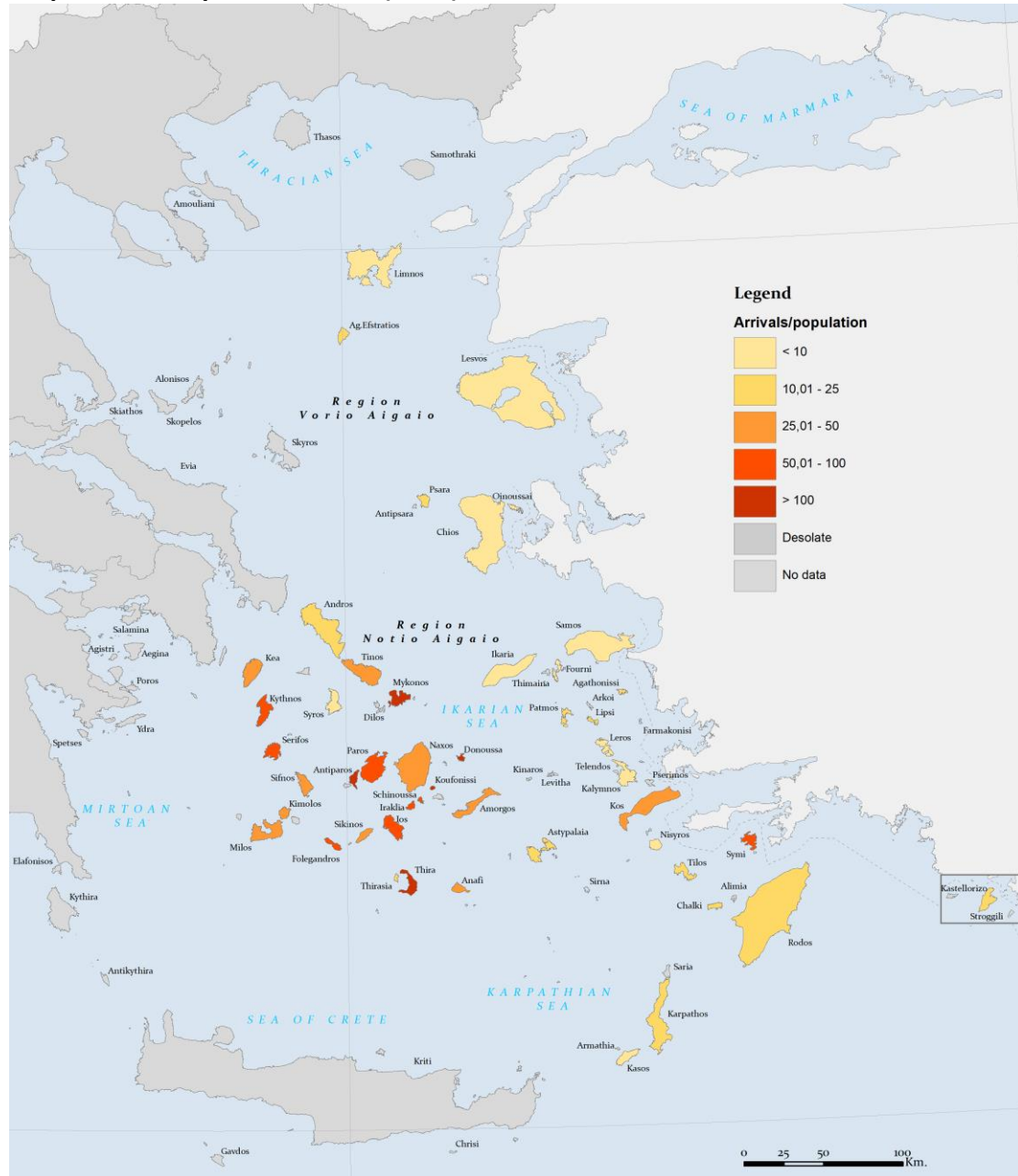
Map 4: Commercial beds/sq.km (2019)



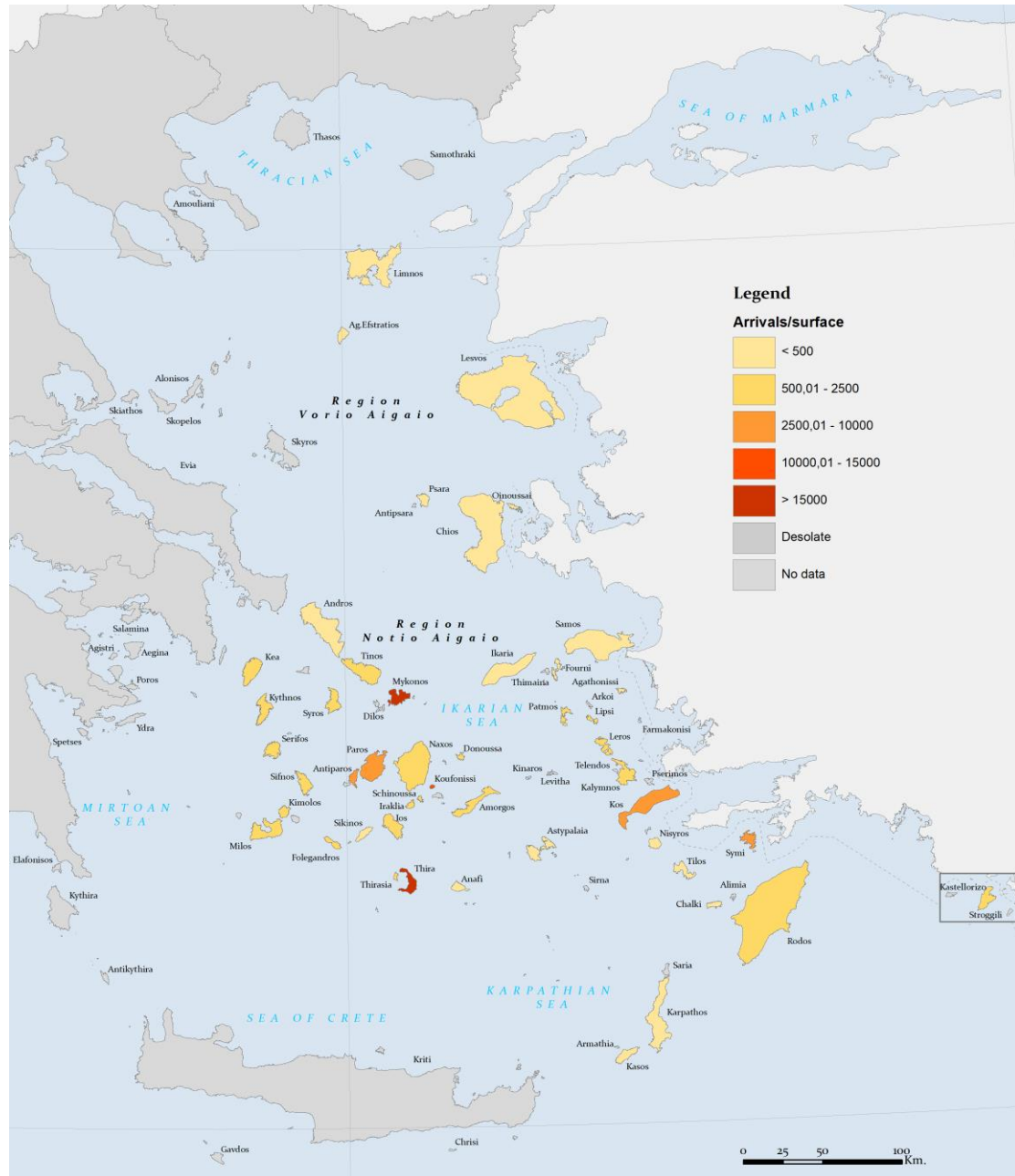
Map 5: average length of stay in hotels (2019)



Map 6: Arrivals per inhabitant (2019)



Map 6: Arrivals per sq2 (2019)



Annex 3: Data

Table 1: The Aegean Islands, administrative division, size and population

Table 2α: Commercial and non-commercial beds per island

Table 2β: Tourism pressure indexes

Table 3α : Tourism Demand: arrivals, overnights spent and average length of stay in hotels of greek and foreigner tourists

Table 3b: Tourism Demand: Arrivals by ship and airplane per island – Evaluation of arrivals of tourists

Table 4: Population evolution

Table 5: Employment per branch (employees and % of the total employment)

Table 6: Active population, employment and unemployment

Table 7: Gross Added Value per branch

Table 1: Aegean islands, population, surface and administrative status

islands	surface	population 2011	population 2019 - estimation	old NUTS 3 areas	new NUTS 3 areas
R. VORIO AIGAIO	3,836	199,231	198,746		
Ag.Efstratios	43.23	270	283	Lesvos	Limnos
Lesvos	1,630.38	86,436	86,346	Lesvos	Lesvos
Limnos	475.61	16,992	17,025	Lesvos	Limnos
Ikaria	255.28	8,423	8,563	Samos	Ikaria
Fourni	30.27	1,459	1,508	Samos	Ikaria
Samos	476.20	32,977	32,939	Samos	Samos
Chios	841.58	51,390	50,744	Chios	Chios
Oinoussai	14.20	826	832	Chios	Chios
Psara	39.77	458	477	Chios	Chios
R. NOTIO AIGAIO	5,286	308,975	294,042		
Agathonissi	13.50	185	189	Dodecanissos	Kalymnos
Astypalaia	96.85	1,334	1,321	Dodecanissos	Kalymnos
Kalymnos	110.88	16,179	15,411	Dodecanissos	Kalymnos
Karpathos	301.18	6,226	6,278	Dodecanissos	Karpathos
Kasos	65.98	1,084	1,105	Dodecanissos	Karpathos
Kos	290.28	33,388	30,797	Dodecanissos	Kos
Lipsi	15.98	790	782	Dodecanissos	Kalymnos
Leros	52.95	7,917	7,834	Dodecanissos	Kalymnos
Megisti	9.13	492	460	Dodecanissos	Rhodos
Nisyros	41.40	1,008	992	Dodecanissos	Kos
Patmos	34.05	3,047	2,966	Dodecanissos	Kalymnos
Rodos	1,398.08	115,490	108,314	Dodecanissos	Rhodos
Symi	58.10	2,590	2,536	Dodecanissos	Rhodos
Tilos	62.83	780	773	Dodecanissos	Rhodos
Chalki	28.13	478	459	Dodecanissos	Rhodos
Amorgos	120.67	1,973	1,955	Kyklades	Naxos
Anafi	38.35	271	290	Kyklades	Thira
Andros	379.67	9,221	9,246	Kyklades	Andros
Antiparos	34.83	1,211	1,142	Kyklades	Paros
Donoussa	13.48	167	168	Kyklades	Naxos
Iraklia	17.60	141	150	Kyklades	Naxos
Thira	75.79	15,231	13,765	Kyklades	Thira
Thirasia	9.30	319	319	Kyklades	Thira

Ios	107.80	2,024	1,953	Kyklades	Thira
Kea	103.58	2,455	2,345	Kyklades	Kea-Kythnos
Kimolos	35.71	910	971	Kyklades	Milos
Koufonissi	5.70	399	398	Kyklades	Naxos
Kythnos	99.26	1,456	1,469	Kyklades	Kea-Kythnos
Milos	150.60	4,977	5,014	Kyklades	Milos
Mykonos	85.48	10,134	9,074	Kyklades	Myknos
Naxos	428.13	17,930	17,233	Kyklades	Naxos
Paros	194.52	13,715	13,218	Kyklades	Paros
Serifos	73.23	1,420	1,465	Kyklades	Milos
Schinoussa	7.78	227	226	Kyklades	Naxos
Sikinos	41.03	273	288	Kyklades	Thira
Sifnos	73.18	2,625	2,576	Kyklades	Milos
Syros	83.63	21,507	21,669	Kyklades	Syros
Tinos	194.21	8,636	8,684	Kyklades	Tinos
Folegandros	32.07	765	788	Kyklades	Thira

Table 2.1: Supply-Commercial and non-commercial accommodation (2019)

islands	hotel beds 2019	beds in complementary establishment	camping posts	total commercial accommodation - beds	Non-commercial accommodation 2011 (beds in secondary houses)	beds in non- commercial accommodation 2011 (beds in non-inhabited houses)	general total of accommodation beds (G+I)
RVA	23.006	15.719	138	38.725	71.643	214.929	253.654
Ag.Efstratios	0	44	0	44	163	489	533
Lesvos	6.955	5.742	0	12.697	29.189	87.567	100.264
Limnos	2.035	1.307	138	3.342	6.932	20.796	24.138
Ikaria	1.083	1.165	0	2.248	4.447	13.341	15.589
Fourni	24	262	0	286	679	2.037	2.323
Samos	9.905	4.612	0	14.517	13.060	39.180	53.697
Chios	2.956	2.582	0	5.538	16.776	50.328	55.866
Oinoussai	0	0	0	0	261	783	783
Psara	48	5	0	53	136	408	461
RNA	223.874	144.869		368.743	113.290	339.870	708.613
Agathonissi	0	40	0	40	35	105	145
Astypalaia	459	1.167	90	1.626	754	2.262	3.888
Kalymnos	1.836	1.093	0	2.929	4.097	12.291	15.220
Karpathos	6.389	1.529	0	7.918	4.182	12.546	20.464
Kasos	52	172	0	224	850	2.550	2.774
Kos	55.456	5.871	60	61.327	5.828	17.484	78.811
Lipsi	125	447	0	572	386	1.158	1.730
Leros	1.211	831	90	2.042	2.325	6.975	9.017
Megisti	106	217	0	323	300	900	1.223
Nisyros	142	221	0	363	1.530	4.590	4.953
Patmos	1.762	1.762	216	3.524	658	1.974	5.498
Rodos	99.031	16.121	0	115.152	21.962	65.886	181.038
Symi	499	704	0	1.203	1.163	3.489	4.692
Tilos	480	514	0	994	822	2.466	3.460

Chalki	96	329	0	425	497	1.491	1.916
Amorgos	543	2.458	957	3.001	1.097	3.291	6.292
Anafi	24	231	0	255	335	1.005	1.260
Andros	1.319	4.349	189	5.668	5.471	16.413	22.081
Antiparos	370	2.553	300	2.923	1.192	3.576	6.499
Donoussa	0	252	0	252	125	375	627
Iraklia	0	389	0	389	125	375	764
Thira	14.986	25.718	519	40.704	7.854	23.562	64.266
Thirasia	0	0	0	0	271	813	813
Ios	2.274	3.209	633	5.483	926	2.778	8.261
Kea	544	2.392	183	2.936	2.743	8.229	11.165
Kimolos	8	381	0	389	878	2.634	3.023
Koufonissi	67	1.347	0	1.414	141	423	1.837
Kythnos	193	1.696	0	1.889	2.077	6.231	8.120
Milos	1.489	5.051	225	6.540	2.465	7.395	13.935
Mykonos	13.394	16.464	405	29.858	5.765	17.295	47.153
Naxos	6.876	11.369	849	18.245	10.040	30.120	48.365
Paros	7.029	16.942	1.794	23.971	7.295	21.885	45.856
Serifos	277	1.995	234	2.272	2.085	6.255	8.527
Schinoussa	0	278	0	278	128	384	662
Sikinos	37	446	0	483	289	867	1.350
Sifnos	967	4.718	180	5.685	2.031	6.093	11.778
Syros	2.524	5.724	183	8.248	7.245	21.735	29.983
Tinos	2.284	5.072	189	7.356	6.847	20.541	27.897
Folegandros	1.025	817	150	1.842	476	1.428	3.270

*total number of posts estimation= numer of tents * 3
persons/tent

Table 2.2 : Supply-Commercial and non-commercial accommodation and pressure indicators (2019)

islands	commercial beds/pop	non-commercial beds/pop	commercial beds /surface	total beds/pop	total beds/surface	total beds + pop/surface
RVA	0.20	0.37	10.17	1.31	66.64	117.46
Ag.Efstratios	0.18	0.67	1.02	2.18	12.33	18.00
Lesvos	0.15	0.35	7.79	1.20	61.50	112.82
Limnos	0.20	0.42	7.03	1.46	50.75	85.47
Ikaria	0.28	0.55	8.81	1.94	61.07	92.62
Fourni	0.21	0.49	9.45	1.68	76.74	122.33
Samos	0.45	0.41	30.49	1.68	112.76	180.03
Chios	0.11	0.33	6.58	1.11	66.38	126.21
Oinoussai	0.00	0.33	0.00	0.98	55.14	111.41
Psara	0.12	0.32	1.33	1.07	11.59	22.38
RNA	1.18	0.36	73.97	2.26	142.15	205.07
Agathonissi	0.23	0.20	2.96	0.82	10.74	23.85
Astypalaia	1.25	0.58	16.79	2.98	40.14	53.60
Kalymnos	0.18	0.25	26.42	0.93	137.27	285.06
Karpathos	1.30	0.69	26.29	3.37	67.95	88.14
Kasos	0.22	0.82	3.39	2.67	42.04	57.81
Kos	1.76	0.17	211.27	2.26	271.50	391.50
Lipsi	0.73	0.49	35.79	2.22	108.26	157.13
Leros	0.26	0.30	38.56	1.17	170.29	316.32
Megisti	0.64	0.59	35.38	2.41	133.95	189.49
Nisyros	0.37	1.55	8.77	5.00	119.64	143.55
Patmos	1.16	0.22	103.49	1.81	161.47	250.57
Rodos	0.97	0.18	82.36	1.52	129.49	214.41
Symi	0.47	0.45	20.71	1.83	80.76	124.92
Tilos	1.28	1.06	15.82	4.47	55.07	67.39

Chalki	0.88	1.03	15.11	3.98	68.11	85.21
Amorgos	1.55	0.57	24.87	3.26	52.14	68.15
Anafi	1.04	1.36	6.65	5.12	32.86	39.27
Andros	0.64	0.62	14.93	2.49	58.16	81.56
Antiparos	2.33	0.95	83.92	5.19	186.59	222.57
Donoussa	1.57	0.78	18.69	3.89	46.51	58.46
Iraklia	2.97	0.95	22.10	5.83	43.41	50.85
Thira	2.42	0.47	537.06	3.83	847.95	1069.52
Thirasia	0.00	0.85	0.00	2.56	87.42	121.51
Ios	2.67	0.45	50.86	4.02	76.63	95.68
Kea	1.18	1.10	28.35	4.50	107.79	131.76
Kimolos	0.47	1.06	10.89	3.63	84.65	107.95
Koufonissi	3.61	0.36	248.07	4.69	322.28	391.05
Kythnos	1.34	1.48	19.03	5.78	81.81	95.96
Milos	1.36	0.51	43.43	2.89	92.53	124.54
Mykonos	2.76	0.53	349.30	4.36	551.63	678.22
Naxos	1.01	0.56	42.62	2.67	112.97	155.21
Paros	1.73	0.53	123.23	3.30	235.74	307.10
Serifos	1.69	1.55	31.03	6.36	116.44	134.75
Schinoussa	1.22	0.56	35.73	2.92	85.09	114.27
Sikinos	1.89	1.13	11.77	5.29	32.90	39.12
Sifnos	2.19	0.78	77.69	4.54	160.95	196.39
Syros	0.40	0.35	98.62	1.45	358.52	605.30
Tinos	0.88	0.82	37.88	3.35	143.64	186.50
Folegandros	2.53	0.65	57.44	4.49	101.96	124.66

Table 3α : Tourism Demand: arrivals, overnights spent and average length of stay in hotels of greek and foreigner tourists

Islands	arrivals hotels	nights spent hotels	average stay	arrivals hotels Gr	nights spent hotels GR	average stay GR	arrivals hotels FOR	nights spent FOR	average stay FOR	FOR/GR arrivals	FOR/total arrivals	FOR/GR nights spent
RVA	401.790	2.008.693	5,0	138.263	467.553	3,38	263.527	1.538.153	5,84	1,91	0,66	3,29
Ag.Efstratios												
Lesvos	119.220	551.146	4,6	50.514	139.863	2,77	68.706	411.283	5,99	1,36	0,58	2,94
Limnos	34.123	177.566	5,2	16.867	59.346	3,52	17.256	118.220	6,85	1,02	0,51	1,99
Ikaria	11.929	45.957	3,9	8.143	29.270	3,59	3.786	16.686	4,41	0,46	0,32	0,57
Fourni	271	1.043	3,9	185	665	3,59	86	379	4,41	0,46	0,32	0,57
Samos	175.721	1.045.599	6,0	32.223	148.040	4,59	143.498	897.559	6,25	4,45	0,82	6,06
Chios	59.532	184.395	3,1	29.840	88.905	2,98	29.692	92.503	3,12	1,00	0,50	1,04
Oinoussai												
Psara	994	2.987	3,0	491	1.464	2,98	503	1.523	3,03	1,02	0,51	1,04
RNA	5.631.486	31.078.851	5,5	595.469	1.988.973	3,34	5.036.018	29.089.878	5,78	8,46	0,89	14,63
Agathonissi												
Astypalaia	3.729	14.625	3,9	1.533	6.316	4,12	2.196	8.309	3,78	1,43	0,59	1,32
Kalymnos	27.906	123.514	4,4	7.743	20.845	2,69	20.163	102.669	5,09	2,60	0,72	4,93
Karpathos	89.157	562.971	6,3	10.504	44.942	4,28	78.653	518.029	6,59	7,49	0,88	11,53
Kasos	719	4.540	6,3	85	362	4,28	634	4.178	6,59	7,49	0,88	11,53
Kos	1.295.163	8.574.525	6,6	66.445	232.285	3,50	1.228.718	8.342.240	6,79	18,49	0,95	35,91
Lipsi	2.449	10.429	4,3	697	2.104	3,02	1.753	8.326	4,75	2,52	0,72	3,96
Leros	21.329	90.827	4,3	6.066	18.320	3,02	15.262	72.506	4,75	2,52	0,72	3,96
Megisti	2.569	16.064	6,3	189	635	3,35	2.379	15.429	6,48	12,57	0,93	24,32
Nisyros	2.752	9.610	3,5	1.784	6.208	3,48	968	3.402	3,51	0,54	0,35	0,55
Patmos	24.495	83.664	3,4	11.750	38.613	3,29	12.745	45.051	3,53	1,08	0,52	1,17

Rodos	2.398.115	14.996.951	6,3	176.730	592.379	3,35	2.221.386	14.404.572	6,48	12,57	0,93	24,32
Symi	10.472	45.871	4,4	3.352	9.372	2,80	7.121	36.499	5,13	2,12	0,68	3,89
Tilos	5.917	33.269	5,6	1.546	4.748	3,07	4.371	28.521	6,53	2,83	0,74	6,01
Chalki	2.489	10.900	4,4	796	2.227	2,80	1.692	8.673	5,13	2,12	0,68	3,89
Amorgos	15.997	547.101	3,4	3.569	109.367	30,64	12.428	437.734	35,22	3,48	0,78	4,00
Anafi	1.017	2.966	2,9	102	243	2,38	915	2.722	2,97	8,97	0,90	11,19
Andros	29.480	97.963	3,3	19.924	59.581	2,99	9.556	38.382	4,02	0,48	0,32	0,64
Antiparos	5.203	21.923	4,2	1.298	4.475	3,45	3.905	17.448	4,47	3,01	0,75	3,90
Donoussa												
Iraklia	0	0	0,0	0	0	0,00	0	0	0,00	0,00	0	0
Thira	634.738	1.850.485	2,9	63.679	151.751	2,38	571.059	1.698.735	2,97	8,97	0,90	11,19
Thirasia	0	0	0,0	0	0	0,00	0	0	0,00	0,00	0	0
Ios	43.984	139.087	3,2	7.467	24.273	3,25	36.517	114.814	3,14	4,89	0,83	4,73
Kea	4.943	13.394	2,7	3.168	6.401	2,02	1.776	6.993	3,94	0,56	0,36	1,09
Kimolos	165	455	2,8	44	102	2,34	121	344	2,85	2,77	0,73	3,36
Koufonissi	1.370	544	0,4	354	101	0,29	1.015	442	0,44	2,87	0,74	4,37
Kythnos	6.042	16.371	2,7	3.871	7.824	2,02	2.170	8.547	3,94	0,56	0,36	1,09
Milos	30.311	83.729	2,8	8.039	20.369	2,53	22.272	63.369	2,85	2,77	0,73	3,11
Mykonos	616.267	2.071.512	3,4	43.141	108.405	2,51	573.126	1.963.107	3,43	13,28	0,93	18,11
Naxos	15.843	541.821	3,4	3.535	108.312	30,64	12.308	433.510	35,22	3,48	0,78	4,00
Paros	154.928	591.929	3,8	35.514	124.672	3,51	119.414	467.257	3,91	3,36	0,77	3,75
Serifos	5.746	16.721	2,9	2.107	6.084	2,89	3.639	10.637	2,92	1,73	0,63	1,75
Schinoussa	0	0	0,0	0	0	0,00	0	0	0,00	0,00	0,00	0,00
Sikinos	932	3.008	3,2	100	373	3,74	832	2.636	3,17	8,34	0,89	7,07
Sifnos	19.691	54.860	2,8	5.348	13.733	2,57	14.343	41.127	2,87	2,68	0,73	2,99
Syros	68.901	227.863	3,3	46.612	138.808	2,98	22.289	89.055	4,00	0,48	0,32	0,64
Tinos	63.792	138.807	2,2	55.715	114.766	2,06	8.077	24.041	2,98	0,14	0,13	0,21
Folegandros	24.876	80.552	3,2	2.662	9.977	3,75	22.214	70.574	3,18	8,34	0,89	7,07

Table 3: Demand: Arrivals by ship and airplane (2019)

Islands	arrivals by ship	correction arrivals by ship	arrivals by airplane domestic flights	correction arrivals by domestic flights	arrivals by airplane international flights	total arrivals (corrected)	arrivals hotels/corrected arrivals island	arrivals/population	arrivals/area
RVA	635,291	314,055	436,604	104,164	204,080	622,299	64.57	3.2	163.48
Ag.Efstratios	7,220	3,704				3,704	0.00	15.1	85.68
Lesvos	158,305	79,797	175,300	33,980	58,387	172,164	69.25	2.1	105.60
Limnos	100,316	59,604	41,226	14,446	9,587	83,637	40.80	5.1	175.85
Ikaria	74,592	47,664	22,717	12,333	0	59,997	19.88	7.4	235.02
Fourni	8,739	4,551				4,551	5.95	3.3	150.35
Samos	97,021	41,985	81,857	17,493	135,309	194,787	90.21	6.1	409.04
Chios	161,419	65,399	115,504	25,912	797	92,108	64.63	1.8	109.45
Oinoussai	19,457	6,741				6,741	0.00	8.4	474.72
Psara	8,222	4,610				4,610	21.57	10.7	115.92
RNA	7,489,817	5,505,611	1,601,958	821,810	4,477,751	10,805,172	52.12	34.5	2167.57
Agathonissi	4,613	3,201				3,201	0.00	18.1	237.11
Astypalaia	22,969	17,565	7,071	5,047	0	22,612	16.49	17.4	233.47
Kalymnos	191,492	96,284	3,931	2,467	0	98,751	28.26	6.0	890.61
Karpathos	22,601	9,529	30,256	13,680	98,148	121,357	73.47	20.0	402.94
Kasos	7,162	4,386	1,181	821	0	5,207	13.81	5.0	78.92
Kos	317,048	138,396	134,863	29,915	1,143,743	1,312,054	98.71	37.7	4519.96
Lipsi	18,166	13,310				13,310	18.40	17.0	832.92
Leros	74,211	34,371	10,732	6,456	0	40,827	52.24	5.3	771.05
Megisti	59,259	4,169	2,774	1,970	0	6,139	41.84	12.1	672.40
Nisyros	20,913	8,097				8,097	33.99	8.2	195.58
Patmos	82,319	58,099				58,099	42.16	19.1	1706.28
Rodos	324,433	154,245	386,993	82,141	2,268,791	2,505,177	95.73	21.1	1791.87

Symi	185,752	150,944				150,944	6.94	58.8	2598.00
Tilos	17,179	8,211				8,211	72.06	10.6	130.69
Chalki	10,924	6,724				6,724	37.01	14.0	239.03
Amorgos	92,604	79,080				79,080	20.23	40.9	655.34
Anafi	13,598	11,266				11,266	9.03	45.8	293.77
Andros	285,573	185,737				185,737	15.87	20.9	489.21
Antiparos	353,120	291,304				291,304	1.79	232.5	8363.59
Donoussa	21,007	19,103				19,103	0.00	118.7	1417.14
Iraklia	13,283	11,315				11,315	0.00	86.4	642.90
Thira	1,088,552	901,292	578,268	334,680	499,476	1,735,448	36.57	103.3	22898.11
Thirasia	12,737	7,145				7,145	0.00	22.5	768.28
Ios	141,979	126,591				126,591	34.74	61.7	1174.31
Kea	142,763	94,143				94,143	5.25	37.9	908.89
Kimolos	46,553	39,897				39,897	0.41	48.0	1117.25
Koufonissi	65,584	61,420				61,420	2.23	156.7	10775.44
Kythnos	93,741	73,589				73,589	8.21	52.4	741.38
Milos	212,990	187,294	37,933	27,329	0	214,623	14.12	44.5	1425.12
Mykonos	846,011	668,623	254,557	206,553	464,990	1,340,166	45.98	123.8	15678.12
Naxos	548,337	429,437	43,849	31,509	0	460,946	3.44	25.5	1076.65
Paros	988,391	786,067	104,570	77,846	2,603	866,516	17.88	62.4	4454.64
Serifos	81,275	68,259				68,259	8.42	50.9	932.12
Schinoussa	18,927	15,655				15,655	0.00	69.0	2012.21
Sikinos	10,964	9,032				9,032	10.32	35.4	220.13
Sifnos	135,725	116,889				116,889	16.85	45.1	1597.28
Syros	364,776	186,020	4,980	1,396	0	187,416	36.76	9.1	2241.01
Tinos	500,681	380,981				380,981	16.74	45.8	1961.70
Folegandros	51,605	47,941				47,941	51.89	65.9	1494.89

Table 4: Population evolution 1951-2011 and estimation* for 2018 & 2019

	1951	1961	1971	1981	1991	2001	2011	2018 est	2019 est
RVA	281172	254328	210298	194872	199072	206121	199231	193990	193,469
Ag.Efstratios	3849	1061	422	296	286	371	270	247	245
Lesvos	126924	117371	97008	88601	87151	90643	86436	83845	83,669
Limnos	24016	21808	17367	15721	17645	18104	16992	16554	16,512
Ikaria	10608	9577	7702	7559	7546	8312	8423	8114	8,054
Fourni	1105	1170	1195	1203	1233	1469	1459	1384	1,380
Samos	47865	41124	32664	31629	33032	33814	32977	32083	32,031
Chios	64672	60061	52487	48700	51060	51936	51390	50526	50,353
Oinoussai	1433	1580	966	703	681	1050	826	806	799
Psara	700	576	487	460	438	422	458	431	429
RNA	235043	222150	206944	233162	257258	302810	308975	313128	313,629
Agathonissi	196	189	160	133	112	158	185	177	177
Astypalaia	1797	1539	1139	1030	1073	1238	1334	1317	1,303
Kalymnos	13387	14017	13097	14295	15706	16441	16179	16346	16,388
Karpathos	7053	6689	5420	4645	5323	6511	6226	6084	6,081
Kasos	1388	1422	1353	1184	1088	990	1084	1045	1,040
Kos	19076	18187	16650	20350	26379	30947	33388	34639	34,834
Lipsi	885	724	597	574	606	698	790	783	781
Leros	7049	6611	8494	8127	8059	8123	7917	7726	7,732
Megisti	574	476	264	222	275	430	492	510	507
Nisyros	2327	1788	1253	916	913	948	1008	1000	990
Patmos	2613	2564	2432	2534	2663	2984	3047	3030	3,034
Rodos	58946	63951	66606	87831	98175	117007	115490	118439	118,726
Symi	3978	3123	2489	2273	2332	2606	2590	2576	2,566

Tilos	1052	789	349	301	279	533	780	778	774
Chalki	580	501	387	334	281	313	478	484	481
Amorgos	2505	2096	1822	1718	1630	1859	1973	1938	1,932
Anafi	532	471	353	292	261	273	271	248	246
Andros	14705	12928	10457	9020	8781	10009	9221	8935	8,885
Antiparos	680	631	538	635	819	1037	1211	1250	1,253
Donoussa	272	210	149	116	111	163	167	161	161
Iraklia	189	155	129	95	115	151	141	131	131
Thira	9332	7751	6196	7083	9360	13670	15231	16286	16,793
Thirasia	501	399	291	245	233	268	319	317	317
Ios	1753	1343	1270	1451	1654	1838	2024	2054	2,053
Kea	3108	2361	1666	1648	1787	2417	2455	2488	2,483
Kimolos	1536	1412	1086	786	728	769	910	842	832
Koufonissi	282	277	238	232	275	366	399	394	392
Kythnos	2536	2064	1586	1502	1632	1608	1456	1408	1,405
Milos	5586	4910	4499	4554	4390	4771	4977	4827	4,821
Mykonos	3391	3633	3823	5503	6170	9320	10134	10747	10,821
Naxos	18593	16703	14201	14037	14838	18188	17930	18052	18,087
Paros	9022	7830	6776	7881	9591	12853	13715	13851	13,882
Serifos	1851	1878	1083	1133	1095	1414	1420	1349	1,341
Schinoussa	226	196	197	140	122	206	227	225	227
Sikinos	590	453	331	290	267	238	273	254	255
Sifnos	2773	2258	2043	2087	1960	2442	2625	2593	2,594
Syros	23130	19570	18642	19668	19870	19782	21507	20753	20,638
Tinos	10187	9273	8232	7730	7747	8574	8636	8363	8,323
Folegandros	862	778	646	567	558	667	765	728	728

*the estimation is based on the annual data of births and deaths

Table 5: Employment per branch (employees and % of the total employment- 2011)

	primary sector	% primary sector	secondary sector	% secondary sector	tertiary sector	% tertiary sector	public sector (+education and health)	% public sector (+education and health)
RVA	8861	14.16	9139	14.60	44596	71.25	19801	31.63
Ag.Efstratios	26	33.77	12	15.58	39	50.65	15	19.48
Lesvos	4823	18.09	3791	14.22	18048	67.69	8172	30.65
Limnos	744	13.25	793	14.13	4077	72.62	2303	41.02
Ikaria	661	30.21	426	19.47	1101	50.32	441	20.16
Fourni	30	9.06	49	14.80	252	76.13	73	22.05
Samos	1215	11.14	1348	12.36	8346	76.49	3578	32.80
Chios	1320	8.00	2678	16.22	12512	75.78	5123	31.03
Oinoussai	26	14.29	33	18.13	123	67.58	56	30.77
Psara	16	13.01	9	7.32	98	79.67	40	32.52
RNA	6175	5.22	20030	16.93	92120	77.86	23292	19.69
Agathonissi	24	33.80	7	9.86	40	56.34	25	35.21
Astypalaia	62	19.25	19	5.90	241	74.84	88	27.33
Kalymnos	499	10.50	942	19.81	3313	69.69	1029	21.64
Karpathos	175	7.95	389	17.68	1636	74.36	431	19.59
Kasos	41	15.53	53	20.08	170	64.39	48	18.18
Kos	423	2.77	1546	10.13	13292	87.09	3232	21.18
Lipsi	37	13.07	57	20.14	189	66.78	64	22.61
Leros	169	6.49	385	14.79	2049	78.72	1188	45.64
Megisti	14	7.49	47	25.13	126	67.38	51	27.27
Nisyros	70	5.89	259	21.80	859	72.31	182	15.32
Patmos	14	5.41	44	16.99	201	77.61	87	33.59

Rodos	1290	2.78	6222	13.42	38837	83.79	9612	20.74
Symi	44	4.86	189	20.88	672	74.25	189	20.88
Tilos	23	8.95	41	15.95	193	75.10	71	27.63
Chalki	11	5.88	38	20.32	138	73.80	43	22.99
Amorgos	120	19.23	141	22.60	363	58.17	106	16.99
Anafi	28	29.47	15	15.79	52	54.74	17	17.89
Andros	479	16.56	775	26.80	1638	56.64	420	14.52
Antiparos	46	11.65	81	20.51	268	67.85	40	10.13
Donoussa	15	24.19	13	20.97	34	54.84	10	16.13
Iraklia	25	40.32	8	12.90	29	46.77	11	17.74
Thira	213	3.33	1061	16.58	5124	80.09	669	10.46
Thirasia	9	13.24	6	8.82	53	77.94	20	29.41
Ios	73	9.59	179	23.52	509	66.89	91	11.96
Kea	143	16.42	269	30.88	459	52.70	108	12.40
Kimolos	21	10.66	71	36.04	105	53.30	39	19.80
Koufonissi	38	19.49	48	24.62	109	55.90	27	13.85
Kythnos	131	24.62	144	27.07	257	48.31	67	12.59
Milos	58	3.39	518	30.26	1136	66.36	280	16.36
Mykonos	135	2.75	1005	20.47	3769	76.78	516	10.51
Naxos	785	13.03	1281	21.26	3959	65.71	1068	17.73
Paros	338	6.34	1363	25.56	3631	68.08	761	14.27
Serifos	43	9.31	144	31.17	275	59.52	66	14.29
Schinoussa	24	25.00	27	28.13	45	46.88	16	16.67
Sikinos	15	17.86	17	20.24	52	61.90	17	20.24
Sifnos	74.00	8.38	249	28.20	560	63.42	116	13.14
Syros	208	2.79	1499	20.12	5743	77.09	1981	26.59
Tinos	223	7.87	807	28.50	1802	63.63	471	16.63
Folegandros	35	11.74	71	23.83	192	64.43	35	11.74
RVA+RNA	15036	8.31	29169	16.12	136716	75.57	43093	23.82

Table 6: Active population, employment and unemployment (2011)

islands	population	active pop	% of actives/pop	employed	% of employed	unemployment	% of unemployment to the actives	Non-actives	% of non-actives to the total pop
Ag.Efstratios	270	87	32.22	79	29.26	8	9.20	183	67.78
Lesvos	86408	32076	37.12	27296	31.59	4780	14.90	53684	62.13
Limnos	16928	6578	38.86	5742	33.92	836	12.71	10202	60.27
Ikaria	8370	3251	38.84	2713	32.41	538	16.55	5119	61.16
Fourni	1459	428	29.34	332	22.76	96	22.43	1031	70.66
Samos	32977	13074	39.65	11303	34.28	1771	13.55	19764	59.93
Chios	51377	19468	37.89	16912	32.92	2556	13.13	31540	61.39
Oinoussai	826	243	29.42	219	26.51	24	9.88	583	70.58
Psara	458	159	34.72	130	28.38	29	18.24	299	65.28
Agathonissi	185	87	47.03	75	40.54	12	13.79	98	52.97
Astypalaia	1334	516	38.68	438	32.83	78	15.12	818	61.32
Kalymnos	16179	5882	36.36	4754	29.38	1128	19.18	10297	63.64
Karpathos	6139	2698	43.95	2262	36.85	436	16.16	3441	56.05
Kasos	1084	334	30.81	267	24.63	67	20.06	750	69.19
Kos	33388	17295	51.80	15359	46.00	1936	11.19	16093	48.20
Lipsi	790	321	40.63	285	36.08	36	11.21	469	59.37
Leros	7917	3113	39.32	2632	33.24	481	15.45	4804	60.68
Megisti	492	213	43.29	199	40.45	14	6.57	279	56.71
Nisyros	1008	441	43.75	327	32.44	114	25.85	567	56.25
Patmos	3047	1337	43.88	1200	39.38	137	10.25	1710	56.12
Rodos	115490	54536	47.22	46874	40.59	7662	14.05	60811	52.65
Symi	2590	1073	41.43	941	36.33	132	12.30	1517	58.57
Tilos	764	299	39.14	273	35.73	26	8.70	465	60.86
Chalki	478	234	48.95	191	39.96	43	18.38	244	51.05
Amorgos	1973	825	41.81	737	37.35	88	10.67	1148	58.19

Anafi	271	111	40.96	99	36.53	12	10.81	160	59.04
Andros	9209	3482	37.81	3024	32.84	458	13.15	5657	61.43
Antiparos	1211	456	37.65	396	32.70	60	13.16	755	62.35
Donoussa	167	76	45.51	69	41.32	7	9.21	91	54.49
Iraklia	141	70	49.65	64	45.39	6	8.57	71	50.35
Thira	15097	7508	49.73	6555	43.42	953	12.69	7589	50.27
Thirasia	319	94	29.47	72	22.57	22	23.40	225	70.53
Ios	2024	986	48.72	880	43.48	106	10.75	1038	51.28
Kea	2452	985	40.17	893	36.42	92	9.34	1467	59.83
Kimolos	910	219	24.07	199	21.87	20	9.13	691	75.93
Koufonissi	399	208	52.13	198	49.62	10	4.81	191	47.87
Kythnos	1456	599	41.14	551	37.84	48	8.01	857	58.86
Milos	4839	1904	39.35	1737	35.90	167	8.77	2935	60.65
Mykonos	10134	5555	54.82	4943	48.78	612	11.02	4579	45.18
Naxos	17970	7283	40.53	6101	33.95	1182	16.23	10648	59.25
Paros	13715	6082	44.35	5376	39.20	706	11.61	7633	55.65
Serifos	1420	543	38.24	484	34.08	59	10.87	877	61.76
Schinoussa	227	115	50.66	103	45.37	12	10.43	112	49.34
Sikinos	273	101	37.00	86	31.50	15	14.85	172	63.00
Sifnos	2625	983	37.45	903	34.40	80	8.14	1642	62.55
Syros	21507	9034	42.00	7525	34.99	1509	16.70	12473	58.00
Tinos	8592	3648	42.46	3149	36.65	499	13.68	4944	57.54
Folegandros	765	346	45.23	314	41.05	32	9.25	419	54.77

Table 7: Gross Added Value per branch

	2017	Agriculture, forestry and fishing	Mining and quarrying- Manufacturing- Electricity, gas, steam and air conditioning supply	Water supply, sewerage, waste management and remediation activities	Construction	Wholesale and retail trade, repair of motor vehicles and motorcycles	Transportation and storage	Accommodation and food service activities	Information and communication	Financial and insurance services	Real estate activities	Professional, scientific and technical activities	Administrative and support service activities
Greece		4,2	13,3	1,5	2,3	10,5	7,0	6,8	3,5	4,1	17,1	3,4	1,8
PNA		5,7	6,4	1,3	3,1	8,4	6,3	9,0	1,9	2,9	16,2	2,5	0,8
<i>Lesvos</i>		6,9	6,1	1,5	3,0	8,5	5,6	8,1	2,4	2,5	15,2	2,9	0,6
<i>Samos</i>		2,8	7,5	0,5	1,9	8,9	7,4	14,8	0,9	2,7	15,9	1,4	1,1
<i>Chios</i>		5,5	6,1	1,5	4,3	7,7	6,8	6,2	1,8	4,0	18,3	2,4	1,0
RNA		2,7	5,5	1,4	3,6	7,9	12,2	29,4	1,0	2,1	12,6	1,9	1,8
<i>Dodecanissos</i>		2,8	5,4	1,7	2,9	8,4	7,2	31,0	1,1	2,1	10,9	2,2	2,2
<i>Kyklades</i>		2,5	5,7	1,1	4,5	7,4	18,2	27,5	0,7	2,0	14,8	1,6	1,4
Kriti		7,3	8,7	1,5	3,3	9,9	6,5	18,8	1,9	2,9	12,4	2,4	2,1
RIN		4,3	3,1	1,5	2,9	9,5	10,6	25,2	1,0	1,9	15,8	2,4	1,9

	Public administration and defence - Compulsory social security	Education	Human health and social work activities	Arts, entertainment and recreation- Other service activities- Activities of households as employers, undifferentiated goods and services producing activities of households for own use
Greece	10,2	5,7	4,4	4,1
RVA	21,0	6,1	4,9	3,6
Lesvos	21,7	6,2	4,6	4,2
Samos	20,3	4,8	5,5	3,6
Chios	20,0	6,8	4,9	2,6
RNA	8,2	3,6	2,2	3,9
Dodecanissos	10,9	4,3	3,0	3,9
Kyklades	5,0	2,7	1,3	3,8
Kriti	7,9	5,5	4,3	4,6
Ionia	6,6	4,0	3,9	5,2