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# Course manual: Comparative Island Research, Spatial and Location Analysis Methods and Applications

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# Introduction

This course combines comparative research as a methodology for conducting case study and comparative analysis for environmental, ecological, social and economic systems with spatial and location analysis from a methodological point of view and with specific applications in comparable research. It addresses three key questions: (a) why comparative research? (b) why islands for comparative research? (c) which topics can be addressed?

Comparative research, unlike many current epistemological paradigms in socioecological studies, tends to be less “ipso-facto” and teleological (i.e., explaining what has happened only after it has happened and adjusting the tools and methods to facilitate this). It tends to be more descriptive rather than prescriptive, using case studies and considering their specificities, similarities and differences. This is not to suggest that all claims towards “representativeness” are dropped, but rather that each case study can provide insight s and lessons for both similarities and differences. Comparative research may not be optimal for all studies and disciplines, but it can be extremely useful and straightforward in highlighting the specificities and wide range of socioecological research.

With comparative research we utilize comparisons. These comparisons are relevant when indeed what we seek to compare is comparable, or we can treat it to make it so. Through these comparisons we seek to (a) describe phenomena or processes in their socioecological context; (b) explain these phenomena and processes, (c) arrive at broader understandings about these phenomena and processes.

Islands are ideal for comparative research:

• There is significant variety of size (area and population), which is an interesting factor and easy to define, describe, classify and compare.

• Input – output wise, flows towards and from islands are easier to define and measure.

• They can be treated as isolated but also as parts of greater local and global networks.

The variety of topics is very large, including environmental, socioecological, economic and cultural. Some approaches can use indexes and indicators, simple or composite, while others can apply more qualitative approaches, while mixed approaches are also possible.

In this course, the basic concepts will be introduced, and examples of different approaches will be presented. Students will be asked to do their own comparative research. The basic tools that will be used will be Spatial and Location Analysis. In the course methods and concepts of Spatial Analysis and Location Analysis are introduced and applied with a focus on island comparable research. This includes the basic analytical methods of Spatial Analysis such as: Distance-Based methods and Point Pattern Analysis. Then, students are introduced to basic concepts of Location Analysis and its applications on comparing islands and the importance of Location (transportation networks, timeseries analysis). Key questions that are addressed include:

-How can we measure isolation and proximity (to islands and/or services) on a (transportation) network? And then compare islands and island groups based on the findings?

-How can we predict biological species richness based on island size and isolation?

-How can we quantify separate and aggregated island (geographical and socioeconomic) characteristics and use the findings for policy prioritization?

-How can we simulate (with the use of Agent Based Models) features between islands and explore the effects of policy interventions?

-How can we estimate Seasonal Supply and Demand measures of islands?

# Learning objectives

After the course the student can:

1. Apply and extend academic skills in understanding and formulating implications of applied research on and between islands (2G, 2H)
2. Develop and improve research competences that are relevant to future career and related to the study programme, including theory- guided empirical research related to planning and evaluating policies (1H, 3A)
3. Apply and extend communication skills required to communicate knowledge and ideas to specialist and non-specialist audiences, including reporting (1H, 2B)
4. Collaborate with others by clearly defining their own contribution in addressing a specific research problem that is original and supported by relevant literature (1D, 3B)
5. Develop students’ analytical understanding of applied and comparative research on and about islands and relevant inter-disciplinary themes.
6. Coherently analyse complex spatial socio-economic phenomena including climate change, vulnerability and resilience, governance, sustainable development as well as policy making and local environments.
7. Understand the importance of islands in a network.
8. Measure and analyse spatial objects on a geographical space such as islands in an Archipelago.
9. Quantify geographical characteristics of islands.
10. Understand and estimate biogeographical and ecological characteristics of islands.
11. Participate in informed decision making with hierarchical methods regarding policy interventions of islands.
12. Quantify supply and demand of services/resource on a seasonal time series such as islands with touristic seasonal aspects (provision of water, personnel, resources).

# Course components

## A. Lectures

The lectures will introduce students to the basic conceptual, theoretical, institutional and practical aspects of both land and marine spatial planning and will provide guidance and material to understand how the geographical and the institutional context affects policy formulation and evaluation and how to plan for and on islands. The lecture plan is as follows:

* Introduction to Case Study Research Approaches and Islands (T. Kizos)
* Introduction to Case Study Research Approaches: Biogeography (T. Tscheulin)
* Different approaches 01: Ecological research (T. Tscheulin)
* Different approaches 02: Socio-ecological research (T. Kizos, I. Spilanis)
* Different approaches 03: Modelling research (I. Spilanis)
* Different approaches 04: Socioeconomic research (T. Kizos)
* Different approaches 05: Social research (T. Kizos)
* Wrapping it all up: comparative research on island laboratories in an era of crisis (T. Kizos)
* Introduction to G.I.S. theory and applications (D. Kavroudakis)
* Introduction to Qgis software, tools and methods (D. Kavroudakis)
* Spatial Data, Table joins, Spatial Joins and Spatial Queries (D. Kavroudakis)
* Comparison between islands based n attributes and weighted combination of spatial features (D. Kavroudakis)
* Time Series of Spatial Data (D. Kavroudakis)
* Spatial Network Analysis (D. Kavroudakis)

## B. Paper writing and presentation in class

During the entire five weeks of the course students will be asked to plan, complete, present, and then submit five empirical papers (1000-1500 words each) related to spatial analysis and comparative island research on one or more of the issues discussed in the lectures. Students will present and discuss the papers in the classroom.

1st paper: visualization

2nd paper: data integration

3rd paper: landscape metrics

4th paper: comparing islands and changes

Final paper: island classification

Students are advised to use spatial data sets for their papers. These papers and the spatial data sets will be made available by an assistant and students are expected to use them also in the following class on terrestrial and maritime planning for/on islands. These data sets will include:

* Land Cover: CORINE land cover data 1990-2018 (including changes): <https://land.copernicus.eu/en/products/corine-land-cover>
* Land cover: Built up areas: soil sealing: <https://land.copernicus.eu/en/products/high-resolution-layer-imperviousness>
* Global human settlements: <https://ghsl.jrc.ec.europa.eu/download.php>
* Footprint: <https://www.footprintnetwork.org/licenses/public-data-package-free/>
* Open street map: <https://www.openstreetmap.org/export#map=2/42.8/22.9>
* Services: open street map: <https://export.hotosm.org/en/v3/>
* Other data sets for Europe from EEA: <https://www.eea.europa.eu/en/datahub>
* Global data sets: Global Island Explorer: <https://rmgsc.cr.usgs.gov/gie/gie.shtml>
* Global Island Database: <https://www.sciencebase.gov/catalog/item/63bdf25dd34e92aad3cda273>

Airbnb: <http://insideairbnb.com/>

FIRM fires: <https://www.earthdata.nasa.gov/learn/find-data/near-real-time/firms>

MSP marine: <https://emodnet.ec.europa.eu/en>

ASTER DEM: [https://search.earthdata.nasa.gov/search](https://search.earthdata.nasa.gov/search/)

Landsat: <https://earthexplorer.usgs.gov/>

OECD database: <https://www.oecd.org/regional/regional-statistics/>

EUROSTAT database: <https://ec.europa.eu/eurostat/web/sdi/database>

<https://ec.europa.eu/commission/presscorner/detail/en/qanda_22_763>

## C. Submitting documents to Eclass / Brightspace

At the end of the course, all students need to submit their paper and upload it to Eclass and Brightspace.

D. *Evaluation and Assessment*

The **evaluation criteria for the 5 assignments** are:

* Accuracy of technical calculations on a GIS system (30%)
* Understanding of the methods used for the analysis on a GIS system (30%)
* Report: structure and presentation of results and interpretation of findings (40%)

The instructors will evaluate the presentations and the written papers that students will deliver and submit.

The **evaluation criteria for the presentations** are:

* Keeping the time
* Familiarity with the subject

Grading will come from

25% from the presentationσ of the papers

75% from the papers

# Course schedule

The course schedule gives an overview when the course components should take place. If you want to change the schedule, please contact the course coordinator to discuss the options.

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| --- | --- | --- | --- | --- | --- |
|  | **Comparative Island Research** | | | | |
|  | **Monday** | **Tueday** | **Wednesday** | **Thursday** | **Friday** |
| **12-16 February** | 12-14 Introduction to Case Study Research Approaches and Islands (T. Kizos) | 12-15 Introduction to Case Study Research Approaches: Biogeography (T. Tscheulin) | 11-14 Introduction to G.I.S. theory and applications (D. Kavroudakis) | 12-15 Different approaches 01: Ecological research (T. Tscheulin) | 1st paper |
| **19-23 February** | 10-12 Different approaches 02: Sustainability Monitoring (I. Spilanis) | 11-14  Introduction to Qgis software, tools and methods (D. Kavroudakis) | 11-14 Spatial Data, Table joins, Spatial Joins and Spatial Queries (D. Kavroudakis) | 12-14 Different approaches 03: Socioeconomic research (T. Kizos) | 2nd paper |
| **26-Feb 1 March** | Support for papers | Support for papers | 11-14 Comparison between islands based 0n attributes and weighted combination of spatial features (D. Kavroudakis) | 12-14 Different approaches 04: Integrated management with modelling (I. Spilanis) | 3rd paper |
| **4-8 March** | 12-14 Integrated management with modelling II (I. Spilanis) | 12-14 Wrapping it all up: comparative research on island laboratories in an era of crisis (T. Kizos) | 11-14 Time Series of Spatial Data (D. Kavroudakis) | Support for papers | 4th paper |
| **10-15 March** | 11-14 Spatial Network Analysis (D. Kavroudakis) | Support for papers | 11-2 Spatial Network Analysis II (D. Kavroudakis) | Support for papers | Final paper |

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| --- | --- | --- | --- | --- | --- |
|  | **Week 1** | **Week 2** | **Week 3** | **Week 4** | **Week 5** |
| **Lectures/ meetings / presentations** | Lectures  1st paper | Lectures  2nd paper | Lectures  3rd paper | Lectures  4th paper | Lectures  Final paper |
| **Other forms of seeing instructors** | Meetings with instructors to discuss progress and methods | Meetings with instructors to discuss progress and methods | Meetings with instructors to discuss progress and methods | Meetings with instructors to discuss progress and methods |  |
| **Student work load** | Students work on weekly paper | Students work on weekly paper | Students work on weekly paper | Students work on weekly paper | Students work on final paper |
| **What to do at the end of the week** | Submit paper | Submit paper | Submit paper | Submit paper | Submit paper |

|  |  |  |
| --- | --- | --- |
| **What is due:** | **When (deadline)** | **Who involved?** |
| 1. Submit weekly papers | End of each week | Student, instructors |
| 2. Complete data set | End of each week | Student, instructors, assistants |
| 3. Present final paper | End of 5th week | Student |
| 4. Submit research paper | End of 5th week | Student |
| 6. Evaluation grade | 1 week later | Instructors |

# Literature list:

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Qgis tutorials

* <https://www.qgistutorials.com/en/>
* <https://gisgeography.com/qgis-tutorial-how-to-use-qgis-3/>
* <https://opensourceoptions.com/blog/qgis-tutorial-for-beginners/>

Qgis videos

* [Playlist “Introduction to QGIS”] <https://www.youtube.com/watch?v=NHolzMgaqwE&list=PLLxyyob7YmEHFg5xvwszKIo_sNZbczlNC>