



Research Notes Letter

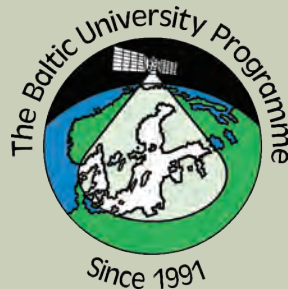
*Research & Innovation for a sustainable
Baltic Sea Region*

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Welcome to the BUP Research Notes Letter:

Research & Innovation for a Sustainable Baltic Sea Region

In this issue of the Research Notes Letter you can see some contributions that give a glimpse of the width and the depth of on-going research in, and on, the Baltic Sea Region from a sustainable development perspective. Most of the contributions have been submitted to the BUP Research Notes on the BUP web site by the authors.

The BUP Research Notes focus on peer review articles, book chapters, conference proceedings, and dissertations regarding the BUP Themes.

The aim with the Research Notes Letter is to spread research findings and to spread knowledge on researchers and research groups in the Baltic Sea Region as a service to BUP Member Universities. We encourage researchers in the Baltic Sea region (BSR) to contribute with research findings to the BUP Research Notes on our web site. Please enter your contribution, preferably within the BUP Themes. Accepted contributions will then also be published in the BUP Research Notes Letter and distributed to the subscribers of the BUP mailing list. For researchers this is an opportunity to both contribute to the development of BUP research and cooperation efforts and to spread research findings and information to a wider audience.

You are welcome to submit your contribution using the Research Notes Form - or if you find it more convenient send a pdf copy of or a link to your article to any of the editors. The contributions should be in English, have a DOI name, deal with any of the BUP Themes, and have a connection with the BSR.

Researchers in the BSR are also welcome to submit their contact information for a Researcher Presentation published under the heading Researchers on the BUP web site. Please see this example and use this online form to submit your information.

Have a nice summer!

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OPEN ACCESS

Teaching Sustainability in European Higher Education Institutions: Assessing the Connections between Competences and Pedagogical Approaches

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Abstract

There has been considerable progress in the incorporation of sustainable development (SD) into higher education institutions' curricula. This has included research on competences for SD and pedagogical approaches used; however, there has been limited research on the connection between how pedagogical approaches are used and how they may develop sustainability competences. A survey was developed, based on the 'connecting sustainable development pedagogical approaches to competences' framework, to investigate sustainability being taught, sustainability competences developed, and pedagogical approaches used in European higher education institutions. The survey was sent to a database of more than 4000 contacts from which 390 complete responses (9.80%) were obtained. The results show that the social dimension was the least addressed at 18% of responses, while the economic, environmental, and cross-cutting dimensions were addressed almost equally. The correlation analyses showed a relation between the contribution to sustainability and the strength of competences, and between the strength of competences and the strength of pedagogical approaches. The results from the survey helped to update the theoretical framework, which provides a more precise perspective on how sustainability competences can be better developed in class, and how to better develop all the sustainability competences.

Reference

Lozano, R., Barreiro-Gen, M., Lozano, F.J., Sammalisto, K., 2019. Teaching Sustainability in European Higher Education Institutions: Assessing the Connections between Competences and Pedagogical Approaches. *Sustainability* 11(6), 1602
DOI: 10.3390/su11061602

OPEN ACCESS

Assessment of modern hydro-meteorological hazards in a big city – identification for Warsaw

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Type of publication

Article peer review

Abstract

Continuous urban development significantly transforms the ecosystem in a big city. The increasing frequency of heat waves and their influence on the rise in mortality in big cities suggest that the thermal hazard (long-term occurrence of high air temperature) is one of the key climatic hazards of present times. The global temperature rise, reinforced in urbanized areas by the anthropogenic heat flux, leads to intensified convection processes and increased precipitation, especially torrential rain. One of the most important hydrological hazards in a big conurbation is the urban flood hazard. In this paper the identified climatic hazards occurring in a big city are analyzed: the thermal hazard and the urban flood hazard. The areas currently exposed to thermal and urban flood hazards in Warsaw are identified and assessed in terms of the hazard level. The results obtained are verified with the data from meteorological measuring stations (the thermal hazard) and from the Fire Department interventions connected with rainfall and flooding (the urban flood hazard). A map of hydro-meteorological hazards was created by combining thermal hazard and urban flood hazard maps. The approach combining the exposure to thermal and urban flood hazards, presented in this study, uses widely accessible spatial data and can be applied to any location. It can also play a significant role in assessing the adaptation of urban areas to climate change and be an important source of information on the current exposure to hydro-meteorological hazards as well as their possible increase.

Reference

Żmudzka E., Kulesza K., Lenartowicz M., Leziak K., Magnuszewski A., 2019. Assessment of modern hydro- meteorological hazards in a big city – identification for Warsaw. *Meteorological Applications*, 2019(1–11).

DOI <https://doi.org/10.1002/met.1779>

OPEN ACCESS

Fostering incidental experiences of nature through green infrastructure planning

Authors

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Type of publication

Article peer

Abstract

Concern for a diminished human experience of nature and subsequent decreased human well-being is addressed via a consideration of green infrastructure's potential to facilitate unplanned or incidental nature experience. Incidental nature experience is conceptualized and illustrated in order to consider this seldom addressed aspect of human interaction with nature in green infrastructure planning. Special attention has been paid to the ability of incidental nature experience to redirect attention from a primary activity toward an unplanned focus (in this case, nature phenomena). The value of such experience for human well-being is considered. The role of green infrastructure to provide the opportunity for incidental nature experience may serve as a nudge or guide toward meaningful interaction. These ideas are explored using examples of green infrastructure design in two Nordic municipalities: Kristianstad, Sweden, and Copenhagen, Denmark. The outcome of the case study analysis coupled with the review of literature is a set of sample recommendations for how green infrastructure can be designed to support a range of incidental nature experiences with the potential to support human well-being.

Reference

Beery, T.H., Raymond, C.M., Kyttä, M., Stahl Olafsson, A., Plieninger, T., Sandberg, M., Stenseke, M., Tengö, M. and Jönsson, K. I., 2017. Fostering incidental experiences of nature through green infrastructure planning. *Ambio*, 46 (7) pp. 717–730.
DOI 10.1007/s13280-017-0920-z

OPEN ACCESS

A supra-national TSO to enhance offshore wind power development in the Baltic Sea? A legal and regulatory analysis

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Type of publication

Article peer review

Abstract

Offshore wind power development is expected to play an important role in meeting the EU climate targets. To integrate offshore wind power, advanced offshore infrastructures such as meshed grids are suggested to optimize the grid development. Meshed offshore grids refer to integrated offshore infrastructure where offshore wind power hubs are interconnected to several countries as opposed to radial connection linking the wind farm to one single country and market. However, development of meshed architectures is hindered by the legal and regulatory barriers.

Earlier research has identified the lack of cooperation and misalignments in national legal and regulatory frameworks as being the main risk factors in integrated offshore network investments. The purpose of this article is to investigate whether a supra-national TSO could facilitate regional cooperation and coordinated investments to develop meshed offshore grids.

Several studies have discussed the case of North Seas, but the Baltic Sea region has had less attention despite the large offshore wind development potential. In this paper, a multi-disciplinary approach combining legal dogmatics and regulatory economics is used to identify the existing barriers and the possible solutions. The Baltic Sea countries are used as illustration. We suggest legal and regulatory recommendations that comply with the EU energy policy targets of sustainability, competition and reliability.

Reference

Sunilaa, K., Bergaentzle, C., Martin, B., Ekroos, A., 2019. A supra-national TSO to enhance offshore wind power development in the Baltic Sea? A legal and regulatory analysis. *Energy Policy*, 128, pp 775-782.
DOI 10.1016/j.enpol.2019.01.047

OPEN ACCESS

Application of satellite sentinel-1 radar images for description of ice phenomena on Dębe reservoir

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Type of publication

Article peer review

Abstract

Winter conditions of low air temperature cause development of ice phenomena at rivers and reservoirs, creating often problems in their exploitation. There is a need to continuously monitor the spatial extension of ice phenomena and their different forms. Local water authority (RZGW Warszawa) prepares for rivers under their administration a daily reports on ice conditions in winter. Ice reports are prepared from visual inspection of the RZGW personnel visiting selected sections of the river course. This is specially problematic in holidays and weekends when usually data from observations are missing. In this study it is tested application of microwave remote sensing data from Sentinel-1 platform to observe the development and recession of the ice cover at the Dębe reservoir in winter 2017. Satellite Sentinel-1 radar images are distributed by the European Space Agency (ESA) on the open access policy. These are two satellites A and B which every 2 days collect images in SAR active remote sensing technique. Dębe reservoir was created in 1963 by closing by the barrage Narew river below its confluence with Bug river. Maximum water head is 7.10 m, and average 6.8 m. Area of the reservoir is 30.3 km² average discharge of Bug river at Wyszków gauge is 162 m³ ·s⁻¹, and Narew river at Zambski Kościelne gauge 139 m³ ·s⁻¹. Retention time of water in the reservoir is 3–4 days. Comparison of the average water temperature at gauge Zambski Kościelne and Wyszków from the winter half-year of the period 1963–1981 shows the increase of water temperature by 0.5–1 C after the year 1972 when Ostrołęka power station was put in to operation. This difference in the temperature between Narew and Bug rivers is reflected by the ice conditions at the end of winter season. Sentinel-1 SAR instrument emits electromagnetic wavelength of 6 cm (C band), and are use two polarizations VH and VV. Using SNAP program geometric correction and color composite was created for selected images at the beginning and end of ice cover at Dębe reservoir on Narew river, covering period January 5-March 6, 2017. It has been found that interpretation of the Sentinel-1 images is most problematic if we want to detect boundary between open calm water and new fast ice. The flow of pancake ice on January 5, 2017 had been recorded and the pattern of ice distribution compared to flow lines calculated by the hydrodynamic CCHE2D model. Result of the hydrodynamic modeling shows circulation pattern in the widest part of the reservoir where are also the most favorable conditions for lake type of ice cover formation. End of ice cover is represented by the image of February 26, 2017 which shows the Narew river free from ice due to higher temperature of the water. Relatively simple visual interpretation of the Sentinel-1 VH and VV images can be used in the study of ice phenomena on major rivers and lakes.

Reference

Magnuszewski, A., 2018. Application of satellite Sentinel-1 radar images for description of ice phenomena on Dębe reservoir, *Acta Scientiarum Polonorum, Formatio Circumiectus*, 17(4), pp 121–130.

DOI 10.15576/ASP.FC/2018.17.4.121 or pdf: http://www.formatiocircumiectus.actapol.net/pub/17_4_121.pdf

OPEN ACCESS

Defining Terms for Integrated (Multi-Inter-Trans-Disciplinary) Sustainability Research

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Type of publication

Article peer review

Abstract

Our contemporary social and ecological problems, including climate change, peak oil and food security, necessitate solutions informed by multiple backgrounds that singular disciplines seem unable to provide, and possibly, are even incapable of providing. The increasing occurrence of multi-, inter- and transdisciplinary (MIT) research projects speak to the recognition of that necessity. But as the literature and our own experiences bear out, just calling a project “beyond disciplinary” or integrated does not necessarily yield the intended outcomes or make progress toward alleviating the hurdles of bridging disciplines. Here we examine the distinctions between three categories (multidisciplinary, interdisciplinary and transdisciplinary) of integrated research and offer reflections on how sustainability researchers can categorize their research to improve common understandings.

Reference

Stock, P. and Burton, R. J. F., 2011. Defining Terms for Integrated (Multi-Inter-Trans-Disciplinary) Sustainability Research. *Sustainability*, 3, no. 8: 1090-1113.
DOI <https://doi.org/10.3390/su3081090>

OPEN ACCESS

Energy Efficiency of the Baltic Sea Countries: An Application of Stochastic Frontier Analysis

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Institutional affiliation

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Type of publication

Article peer review

Abstract

Using the stochastic frontier analysis (SFA) model, this research measures total-factor energy efficiency (TFEE) and disaggregate input efficiency for 10 countries across the Baltic Sea from 2004 to 2014. Real capital, labor, energy use, and carbon dioxide (CO₂) are input variables, real gross domestic product (GDP) is the output variable, and renewable energy consumption and urban population are the environmental variables. The results provide not only the TFEE scores, in which statistical noise is considered, but also the determinants of inefficiency, which show the following. (i) Norway, Sweden, Finland, and Latvia perform better with respect to energy efficiency than other countries in the Baltic Sea Region. (ii) Interestingly, the average energy use efficiency scores from 2004 to 2014 in the 10 Baltic countries exhibit a gradual upward trend except for 2009. (iii) For the inefficiency estimates, higher renewable energy consumption and urban population correspond to higher TFEE scores.

Reference

Hsiao, W.-L., Hu, J.-L., Hsiao, C., Chang, M.-C., 2019. Energy Efficiency of the Baltic Sea Countries: An Application of Stochastic Frontier Analysis. *Energies*, 12(1), 104.
DOI <https://doi.org/10.3390/en12010104>

OPEN ACCESS

Baltic Sea ecosystem response to various nutrient load scenarios in present and future climates

Authors

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Type of publication

Article peer review

Abstract

The Baltic Sea is a shallow, semi-enclosed brackish sea suffering like many other coastal seas from eutrophication caused by human impact. Hence, nutrient load abatement strategies are intensively discussed. With the help of a high-resolution, coupled physical-biogeochemical circulation model we investigate the combined impact of changing nutrient loads from land and changing climate during the 21st century as projected from a global climate model regionalized to the Baltic Sea region. Novel compared to previous studies are an extraordinary spin-up based upon historical reconstructions of atmospheric, nutrient load and runoff forcing, revised nutrient load scenarios and a comparison of nutrient load scenario simulations with and without changing climate. We found in almost all scenario simulations, with differing nutrient inputs, reduced eutrophication and improved ecological state compared to the reference period 1976–2005. This result is a long-lasting consequence of ongoing nutrient load reductions since the 1980s. Only in case of combined high- end nutrient load and climate scenarios, eutrophication is reinforced. Differences compared to earlier studies are explained by the experimental setup including nutrient loads during the historical period and by the projected nutrient loads. We found that the impact of warming climate may amplify the effects of eutrophication and primary production. However, effects of changing climate, within the range of considered greenhouse gas emission scenarios, are smaller than effects of considered nutrient load changes, in particular under low nutrient conditions. Hence, nutrient load reductions following the Baltic Sea Action Plan will lead to improved environmental conditions independently of future climate change.

Reference

Saraiva, S., Markus Meier, H.E., Andersson, H., Höglund, A., Dieterich, C., Gröger, M., Hordoir, R., Eilola, K., 2019. Baltic Sea ecosystem response to various nutrient load scenarios in present and future climates. *Climate Dynamics*, 52: 3369.
DOI <https://doi.org/10.1007/s00382-018-4330-0>

The role of green and Sustainability Offices in fostering sustainability efforts at higher education institutions

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Type of publication

Article peer

Abstract

Green and Sustainability Offices are special settings, which assist initiatives within higher education institutions to coordinate their efforts and work in the field of sustainable development. The set-up of such offices is known to be an effective tool in supporting the implementation of sustainability initiatives on campuses, and in fostering awareness among students and staff on matters related to sustainable development. But despite their usefulness and proven effectiveness, the use of Green Offices and Sustainability Offices is not as wide as it could -or should-be. Also, there is a limited amount of empirical international work performed to date, which have investigated the various barriers related to their works. This paper, which focuses on the role played by green offices in a higher education context, addresses a research gap. On the basis of the need to address this research gap, this paper presents the results of an international study on Green and Sustainability Offices, performed with a sample of 70 higher education institutions from round the world. The study consisted of an on-line survey, which identified the extent to which Green Offices or similar governance structures are being deployed, some specific aspects of their operations and the barriers or difficulties related to their activities. The study concludes by suggesting some topics higher education institutions may take into consideration, in order to maximize their potential benefits.

Reference

Leal Filho, W., Will, M., Lange Salvia, A., Adomßent, M., Grahl, A. Spira, F., 2019. The role of green and Sustainability Offices in fostering sustainability efforts at higher education institutions. *Journal of Cleaner Production*, 232, p1394-1401.
DOI <https://doi.org/10.1016/j.jclepro.2019.05.273>

'Successful' low-carbon energy transitions at the community level? An energy justice perspective

Authors

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Institutional affiliation

1) Lund University, Sweden

Type of publication

Article peer

Abstract

The aim of this paper is to critically analyze so-called 'successful' low-carbon energy transitions under the energy justice magnifying glass. We focus on two case studies that have been arguably referred to as successful local energy transitions in the literature: Samsø (Denmark) and Feldheim (Germany). The study examines community perspectives and causal inferences about perceived energy (in)justice during the transition to a low-carbon local energy system. Theories of justice and process tracing form the core of our methodological approach. We identify and examine evidence in relation to four main areas: consultation processes, information flow/sharing, decision-making and outcomes. The findings reveal that the transition processes were triggered by a multi-dimensional crisis in a unique context, and highlight the role of procedural justice in the investigated areas. Multiple tensions and conflicts were identified (notably concerning the location and ownership of wind turbines). However, and strongly driven by local, bottom-up, intensive information and consultation processes, evidence of perceived procedural justice was found in both cases. With regard to distributive justice, communities perceived the outcomes of the transition as beneficial to some groups, particularly from the point of view of benefits for individuals. Perceived energy justice was more positive if social and environmental outcomes were considered, including the implementation of compensation schemes. However, a quantitative analysis is required to qualify these assertions. With due limitations, we conclude that the perceived fairness of procedures, as identified in both cases, seemed to be a critical pre-condition for the perceived legitimacy of outcomes.

Reference

Mundaca, L., Busch, H. and Schwer, S., 2018. 'Successful' low-carbon energy transitions at the community level? An energy justice perspective. *Applied Energy*, 218: 292-303. DOI 10.1016/j.apenergy.2018.02.146

Responsible Research and Innovation in Industry: From Ethical Acceptability to Social Desirability

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Type of publication
Book chapter

Abstract

The purpose of this chapter is to provide a synthesis of the current body of knowledge on Responsible Research and Innovation (RRI) as an emerging paradigm and a novel approach to governing science and innovation with the aim of making them ethically acceptable and socially desirable. The text focuses on RRI relevance not only as a new framework for research and innovation policy but also as a novel expression of Corporate Social Responsibility (CSR) in enterprises engaged in technological innovation. Theoretical and practical issues concerning the link between RRI and CSR are studied. Additionally, an approach based on Future-Oriented Technology Assessment is proposed as a practical mechanism of advancing RRI in an enterprise or a whole sector.

Reference

Nazarko, Ł., 2019. Responsible Research and Innovation in Industry: From Ethical Acceptability to Social Desirability. In: Golinska-Dawson, P., Sychała, M. (eds.) *Corporate Social Responsibility in the Manufacturing and Services Sectors*. EcoProduction (Environmental Issues in Logistics and Manufacturing). Berlin, Heidelberg. Springer.
DOI 10.1007/978-3-642-33851-9_7

An overview of the problems posed by plastic products and the role of extended producer responsibility in Europe

Authors

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Type of publication

Peer review article

Abstract

Plastic products are easy and convenient for our everyday use, but their negative impacts on human health and the environment cannot be overlooked. The negative impacts and effects of plastic waste are now widely known and have been subject of much recent media coverage, both in Europe and on a global level.

Faced with increasing amounts of plastic waste, the European Union as a whole and many European governments in particular, are currently revising the policy options available to cope with the problem. One of the tools which may be deployed with a view to reducing the pressures posed by plastic waste, is the Extended Producer Responsibility principle. It is considered to be one of the major waste management policy instruments that support the implementation of the European waste hierarchy. Its application may assist in fostering the collection and recycling of waste streams that contain plastic. This paper presents an overview of the problems posed by plastic waste, and outlines their environmental dimensions. It discusses the role of the Extended Producer Responsibility principle and provides some recommendations that may be useful in enhancing extended producer responsibility.

Reference

Leal Filho, W., Saari, U., Fedoruk, M., Iital, A. Moora, H., Klöga, M., Voronova, V., 2019. An overview of the problems posed by plastic products and the role of extended producer responsibility in Europe. *Journal of Cleaner Production*, 214, pp 550-558.
DOI 10.1016/j.jclepro.2018.12.256

Challenges of urban green space management in the face of using inadequate data

Authors

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Type of publication

Article peer review

Abstract

Effective urban planning, and urban green space management in particular, require proper data on urban green spaces. The potential of urban green spaces to provide benefits to urban inhabitants (ecosystem services) depends on whether they are managed as a comprehensive system of urban green infrastructure, or as isolated islands falling under the responsibility of different stakeholders. Meanwhile, different urban green space datasets are based on different definitions, data sources, sampling techniques, time periods and scales, which poses important challenges to urban green infrastructure planning, management and research. Using the case study of Lodz, the third largest city in Poland, and an additional analysis of 17 other Polish cities, we compare data from five publicly available sources: 1) public statistics, 2) the national land surveying agency, 3) satellite imagery (Landsat data), 4) the Urban Atlas, 5) the Open Street Map. The results reveal large differences in the total amount of urban green spaces in the cities as depicted in different datasets. In Lodz, the narrowly interpreted public statistics data, which are aspatial, suggest that green spaces account for only 12.8% of city area, while the most comprehensive dataset from the national land surveying agency reveals the figure of 61.2%. The former dataset, which excludes many types of green spaces (such as arable land, private and informal green spaces), is still the most commonly used. The analysis of the 17 other cities confirms the same pattern. This results in broader institutional failures related to urban green infrastructure planning, management, and research, including a lack of awareness of green space quality (e.g. connectivity) and benefits (ecosystem services), and the related political disregard for urban green spaces. Our comparison suggests that a better understanding of green space data sources is necessary in urban planning, and especially when planning urban green infrastructure.

Reference

Feltynowski, M., Kronenberg, J., Bergier, T., Kabisch, N., Łaszkiewicz, E., Strohbach, M., 2018. Challenges of urban green space management in the face of using inadequate data. *Urban Forestry & Urban Greening*, 31 pp 56–66.
DOI: 10.1016/j.ufug.2017.12.003

Subjective perception of noise exposure in relation to urban green space availability

Authors

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Type of publication

Article peer review

Abstract

Noise pollution has been recognized as one of major threats to the health of urban residents. Increasing green space availability can create a natural buffer to the adverse effects of living in an urban environment. These positive effects of urban green space can be directly related to an objective reduction of noise levels and – indirectly – to the subjective perception of noise exposure. In our study carried out in Lodz, Poland, we explored the relationship between objective noise levels and the subjective perception of noise exposure by urban residents in relation to urban green space availability. We refer to objective noise exposure expressed as GIS modelled Lden derived from noise maps (compliant with the Environmental Noise Directive, 2002/49/EC), and subjective (self-reported) perception of noise exposure as declared in a questionnaire-based survey. We compared the percentage of green space in a buffer, the objectively measured noise level, and the perceived exposure to noise to find the most appropriate radius of the green space buffer. We decided to choose the green space coverage which is not correlated with an objective noise level to avoid potential multicollinearity in regression models. This contrasts with most studies, in which the radius of the buffer is set a priori. We thus compared the selected buffer of green space coverage – 300 m (representing green space availability) – with perceived noise exposure. We used the spatial error probit model to differentiate the impacts of objective and subjective noise indicators, at the same time including also the factor of green space availability. We found out that the direct effect of objectively measured noise levels, education, the presence of noisy neighbors, and building characteristics were the most important variables influencing the self-reported perception of noise by urban residents. The indirect effect of green space availability on noise perception was not strong, yet statistically significant. Although our study does not provide clear-cut evidence, it indicates that the indirect, psychological effects of urban green spaces can positively affect the life satisfaction of urban residents.

Reference

Koprowska, K., Łaszkiwicz, E., Kronenberg, J., Marcińczak, S., 2018. Subjective perception of noise exposure in relation to urban green space availability. *Urban Forestry & Urban Greening*. 31 pp 93– 102.
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The Baltic Sea as a time machine for the future coastal ocean

Authors

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Review

Abstract

Coastal global oceans are expected to undergo drastic changes driven by climate change and increasing anthropogenic pressures in coming decades. Predicting specific future conditions and assessing the best management strategies to maintain ecosystem integrity and sustainable resource use are difficult, because of multiple interacting pressures, uncertain projections, and a lack of test cases for management. We argue that the Baltic Sea can serve as a time machine to study consequences and mitigation of future coastal perturbations, due to its unique combination of an early history of multistressor disturbance and ecosystem deterioration and early implementation of cross-border environmental management to address these problems. The Baltic Sea also stands out in providing a strong scientific foundation and accessibility to long-term data series that provide a unique opportunity to assess the efficacy of management actions to address the breakdown of ecosystem functions. Trend reversals such as the return of top predators, recovering fish stocks, and reduced input of nutrient and harmful substances could be achieved only by implementing an international, cooperative governance structure transcending its complex multistate policy setting, with integrated management of watershed and sea. The Baltic Sea also demonstrates how rapidly progressing global pressures, particularly warming of Baltic waters and the surrounding catchment area, can offset the efficacy of current management approaches. This situation calls for management that is (i) conservative to provide a buffer against regionally unmanageable global perturbations, (ii) adaptive to react to new management challenges, and, ultimately, (iii) multisectorial and integrative to address conflicts associated with economic trade-offs.

Reference

Reusch, T.B.H., Dierking, J., Andersson, H.C., Bonsdorff, E., Carstensen, J., Casini, M., Czajkowski, M., Hasler, B., Hinsby, K., Hyytiäinen, K., Johannesson, K., Jomaa, S., Jormalainen, V., Kuosa, H., Kurland, S., Laikre, L., MacKenzie, B.R., Margonski, P., Melzner, F., Oesterwind, D., Ojaveer, H., Refsgaard, J.C., Sandström, A., Schwarz, G., Tonderski, K., Winder, M., Zandersen, M., 2018. The Baltic Sea as a time machine for the future coastal ocean. *Science Advances*, 4(5), eaar8195
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Environmental intensity of economic growth in the Baltic Sea region

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Article peer review

Abstract

National economic development is subject to a number of restrictions. One of the main constraints is the threat of complete exhaustion of non-renewable resources and environmental pollution exceeding the capacity of the planet. However, the rapid spread of resource-saving technologies is reducing the environmental intensity of economic activities. In this study, I aim to examine the ecological-economic dynamics of the environmental effects of economic development in the regions of Russia's North-Western Federal District (NWFD). I employ an extended version of Peter A. Victor's model to produce a comprehensive evaluation of changes in economic indicators and correlate them with the total and specific environmental impact. I conduct a factor analysis to identify the main effects influencing the ecological-economic dynamics. The use of water resources in the NWFD demonstrates green growth, whereas electricity consumption and wastewater treatment fall into the brown zone and industrial and municipal waste treatment into the black one. The factor analysis has shown that population change has a very weak effect on the situation. Much more influential factors are the income effect (higher incomes translate into greater consumption and thus more significant pollution levels) and the technological effect produced by a decrease in the environmental intensity of production. To promote green development, it is advisable to increase the influence of the technological effect by stimulating resource efficiency and switching to the circular economy model.

Reference

Tretyakova, E.A., 2019, Environmental intensity of economic growth in the Baltic Sea region. *Baltic Region*, 11(1), pp 14-28.
DOI 10.5922/2079-8555-2019-1-2

Genetic diversity in *Dactylorhiza majalis* subsp. *majalis* populations (Orchidaceae) of northern Poland

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Type of publication

Article peer review

Abstract

We analyzed 16 populations of *Dactylorhiza majalis* subsp. *majalis* from northern Poland, simultaneously utilizing both morphological and molecular data. Genetic differentiation was examined using five microsatellite loci, and morphological variation was assessed for 23 characters. At the species level, our results showed a moderate level of genetic diversity ($A = 6.00$; $A_e = 1.86$; $H_o = 0.387$; $FIS = 0.139$) which varied between the studied populations ($A = 2.60$ – 4.20 ; $A_e = 1.68$ – 2.39 ; $H_o = 0.270$ – 0.523 ; $FIS = -0.064$ – 0.355). A significant excess of homozygotes was detected in five population, while excess of heterozygotes was observed in four populations, but the latter values were statistically insignificant. Moderate, but clear between population genetic differentiation was found ($FST = 0.101$; $p < 0.001$). Considering pairwise- FST and number of migrants among populations, we recognized three population groups (I, II, III), where the first could be further divided into two subgroups (Ia, Ib). These three groups differed with respect to gene flow values ($Nm = 0.39$ – 1.12). The highest number of migrants per generation was noticed among populations of subgroup Ia (8.58), indicative of a central panmictic population with free gene flow surrounded by peripatric local populations (Ib) with more limited gene flow. Geographic isolation, habitat fragmentation and limited seed dispersal are inferred to have caused limitations to gene flow among the three indicated population groups. There was a significant correlation between the morphological and genetic distance matrices. A weak but significant pattern of isolation by distance was also observed ($r = 0.351$; $p < 0.05$).

Reference

Naczek, A.M. Ziętara, M.S., 2019. Genetic diversity in *Dactylorhiza majalis* subsp. *majalis* populations (Orchidaceae) of northern Poland. *Nordic Journal of Botany*, 37.
DOI:10.1111/njb.01989

Approaches to Ecosystem Services and Biodiversity Assessment in Belarus

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Type of publication

Book chapter

Abstract

Purpose—Sustainable economic development requires consideration of economic, social and environmental factors. Since the last decade of the twentieth century, there has been a demand for statistical data reflecting the state of the natural environment and the impact on it of human society. At the same time, statistics are required that reflect the impact of ecosystems on the economy. Due to human activities there is an increasing uncertainty about the amount of environmental assets that are currently available in any country. The goal of the work is to consider the world trends in the definition of ecosystem services, their evaluation and accounting, and implementation of ecosystem services in the Republic of Belarus.

Design/methodology/approach—Descriptions of trends related to quantifying the natural resources in EC countries and worldwide are provided. Comparative study of Belarus approaches to implementation of the best ecological practices was developed.

Findings—Belarus has some unique practices in the field of ecosystem services management, which also may be analyzed and disseminated as good practices of ecosystem accounting and management, including forest resources management related with wild medical plants, berries and mushrooms, as well as cultivation of lands contaminated with radionuclides after Chernobyl disaster and monitoring of radioactive contamination and biodiversity, especially related with cross-border contamination between Belarus, Russia and Ukraine.

Originality/value—The comprehensive analysis of modern tendencies in natural capital and ecosystem services assessment and biodiversity was suggested.

Reference

Zenchanka S., Gorbachev N., 2019, Approaches to Ecosystem Services and Biodiversity Assessment in Belarus' in: Leal Filho W., Barbir J., Preziosi R. (eds.) *Handbook of Climate Change and Biodiversity*. Climate Change Management. Springer, Cham.
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The history of viticultural land use as a determinant of contemporary regional development in Western Poland

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Type of publication

Article peer review

Abstract

Many regions in Europe have unique and characteristic landscapes, partly resulting from historical and/or current economic activities that have become a contemporary land mark. At present, there is a trend to show these unique features by emphasizing local traditions or recreating historical ones that were often forgotten a long time ago. Viticulture is one of these activities that becomes an important element of the culture and landscape development. This is also a determinant of the agri- and gastronomic tourism. Historically, Central and Eastern Europe had smaller vineyard areas than Western and particularly Southern European regions, mainly because of the climate conditions. However, viticulture traditions were developed in some western parts of Poland, especially in Lower Silesia. Our analysis of historical documents indicated that in the past cities such as Zielona Góra, Gubin, Krosno, Sulechów and Świebodzin were well-known European viticulture centres. Nowadays, as a result of the stronger position of regions in Europe, their wine-making history is being recognized, new production vineyards are being created, and campaigns are being launched to encourage vineyards and visits for tasting local wines. Our study of regional economic trends has revealed that oenological tourism has perceived as an important element of the economic development of historical wine-making regions and former vineyards. Museums, thematic parks, tourist routes and even wine spa are being established. These activities perfectly fit in with agricultural tourism, creating an important group of the wine tourism and support interesting, individual forms and characteristics of regional culture. Based on the experiences of the Lubusz Province (Poland) a conceptual framework for the development of oenological tourism has been proposed for other Central and Eastern European, but also worldwide regions with a history of viticultural land use.

Reference

Greinert, A., Kostecki, J., Vystavna, Y., 2019. The history of viticultural land use as a determinant of contemporary regional development in Western Poland. *Land Use Policy*, 85, pp 249-258.

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