European universities supporting legal and community capacities for Ukraine’s environmental recovery
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STUDENT`S CITIZEN SCIENCE PROJECT

ENVIRONMENT: WAR IMPACT ON REGIONAL DEVELOPMENT IN TERMS OF SDG

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THE CONCEPT

SDG framework is a comprehensive approach for defining, measuring, monitoring and governing sustainable development on different levels: a community, a city, a region, a country, a world.

In Ukraine there are several approaches to measure the regional development, which aims to develop an integrative index for policy making and implementation. These approaches address both actual performance and the potential;

The war has caused a massive damage to the potential of regional development. To define this damage a great variety of factors shall be inspected, measured and reported

This goal gives room for citizen-science methods to tackle the data gathering and analysis

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- Take an existing integrative approach for measuring the regional development to adopt for Sustainable Development Goal framework
- Apply SDG-adjusted index for regional development to trace its dynamics over selected regions (oblasts) in Ukraine for a timeframe of 2019-2024
- Define the shifts in regional development index in terms of its key factors to find the areas related to SDG where the war caused the major damage
- Develop approach for citizen science application of tracing factors and indicators of regional development and SDG monitoring

THE METHODOLOGY OF THE PROJECT

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THE TEAM

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Bachelor's students of the Faculty of Hydrometeorology and Ecology, Ecology specialty Margarita Ostrovska.

THE MENTORS

Anhelina Chugai – doctor of science, professor, head of the department of ecology and environmental protection at the faculty of hydrometeoroly and ecology

Yurii Hrinchenko – Doctor of science, assistant profess of the department of marketing and business administration at faculty of economics and law

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SUSTAINABLE DEVELOPMENT GOALS

The 2030 Agenda for Sustainable Development, adopted by all United Nations (UN) members in 2015, created 17 world Sustainable Development Goals (SDGs).

The SDGs are universal, time-bound, and legally non-binding policy objectives agreed upon by governments. They come close to prescriptive international norms but are generally more specific, and they can be highly ambitious.

The lists of targets and indicators for each of the 17 SDGs was published in a UN resolution in July 2017. Each goal typically has eight to 12 targets, and each target has between one and four indicators used to measure progress toward reaching the targets, with the average of 1.5 indicators per target.

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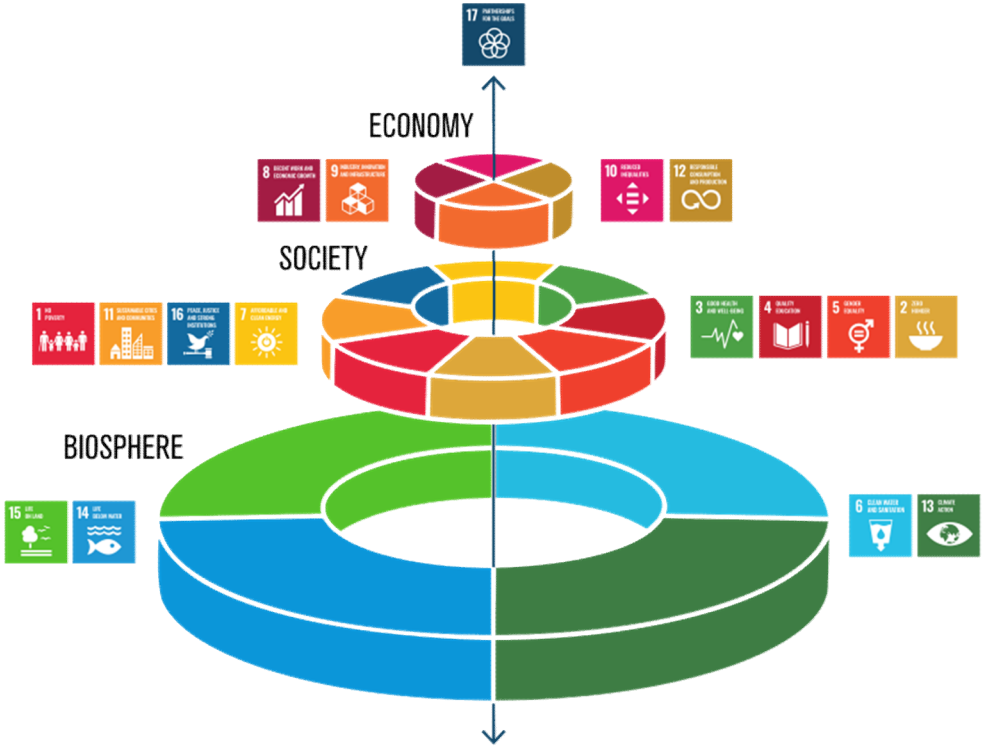

SDG indicators may be split in three major categories:

- Economic: SDGs 8, 9, 10,12 (55 indicators)
- Ecologic: SDGs 6, 13, 14, 15 (43 indicators)
- Social SDGs 1, 2, 3, 4, 5, 7, 11, 16 (126 indicators)

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INDEX OF SUSTAINABLE DEVELOPMENT (IDS) OF THE REGIONS OF UKRAINE

According to the ISD, sustainable development is assessed using the corresponding index (Isd) in the space of three dimensions: economic (Iec), ecological (Ie) and social + institutional (Is).

This index is a vector whose norm determines the level of sustainable development, and its spatial position in the coordinate system (Iec, Ie, Is) characterizes the degree of "harmonization" of this development (the degree of harmonization of sustainable development - G).The equidistance of the vector I sd from each of the coordinates (Iec, I e, Is) will correspond to the greatest harmonization of sustainable development.

The approach of this vector to one of the coordinates will indicate a priority development in the corresponding dimension and neglect of the other two. The index (Isd) and the degree of harmonization of sustainable development (G) are calculated from the components (Iec), (Ie), (Is).

By the degree of harmonization of sustainable development is understood the angle between the vector Isd and the "ideal" vector, which is equally distant from each of the coordinates Iec, Ie, Is

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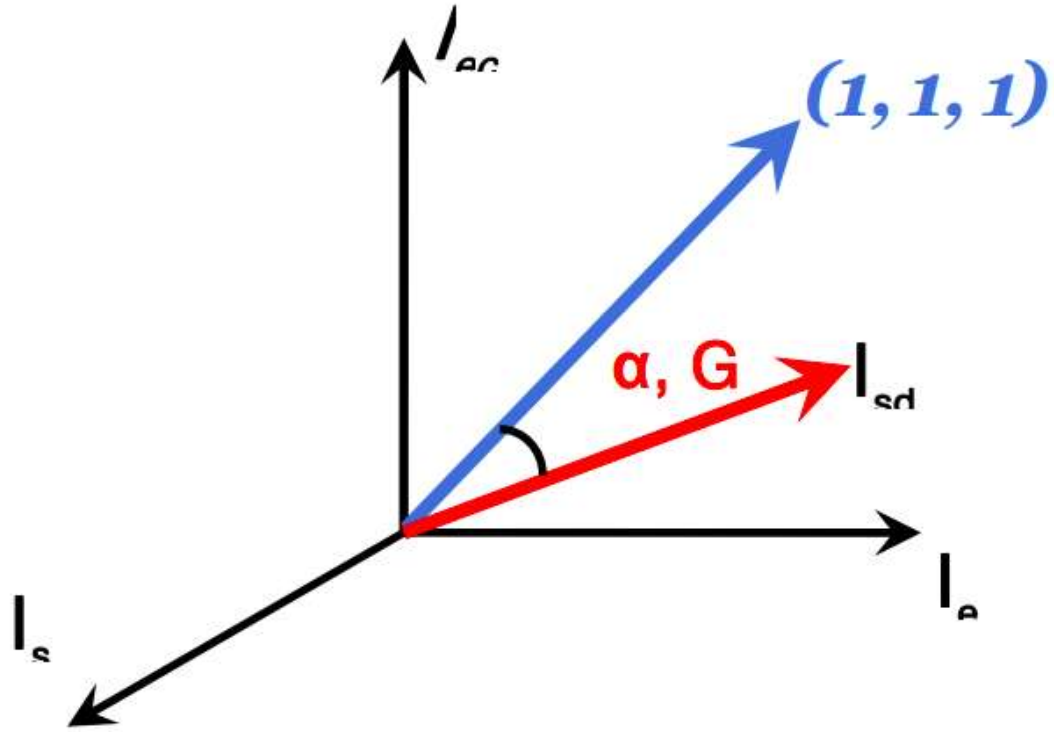
MEASURING THE HARMONIZATION INDEX



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THE ECONOMIC INDICATORS OF THE MEASUREMENT

I. Basic needs	1. Gross national product; 2. Industrial and agricultural sphere; 3. Service sector 4. Transport infrastructure	III. Labor market	10. Labor market efficiency; 11. Labor market opportunities; 12. Income and expenditure balance
II. Entrepreneurial activity	5. Production capabilities; 6. International trade cooperation; 7. Small business; 8. Consumer market; 9. Debt	IV. Innovations and investments	13. Scientific activity; 14. Level of innovation; 15. Investment opportunities

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THE ECOLOGICAL INDICATORS OF THE MEASUREMENT

I. Ecologic systems	1. Air; 2. Biodiversity; 3. Land;	4. Water quality; 5. Water quantity; 6. Radiation and environmental hazards
II. Ecologic load	7. Emissions into the atmosphere; 8. Loads on ecosystems;	9. Waste generation and use; 10. Water load
III. Regional ecologic governence	11. Participation in environmental projects; 12. Greenhouse gas emissions;	13. Environmental transboundary pressure

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THE SOCIAL INDICATORS OF THE MEASUREMENT

I. Knowledge economy and society	1. Intellectual assets of society; 2. Prospects of development of society; 3. Quality of development of society	III. Institutional development	9. Political awareness; 10. Influence of religious institutions; 11. Effectiveness of state power
II. Development of the human capital	4. Development of health and physical education; 5. Level of education; 6. Demographic development; 7. Labor market; 8. Economic component of human development	IV. Quality of life	12. Recreation and culture of people; 13. State of the environment; 14. Freedom of people; 15. Health of people; 16. State of infrastructure; 17. Risks and safety of life

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PROJECT EVOLUTION

Stage 1. The project group relates the open source data to all 231 indicators while estimating the level of coverage for every of 17 SDGs

Stage 2. The project group used the IDS methodology as guideline but applied indicators related to SDG instead of original indicators of the model

Stage 3. The project group calculated IDS for three regions for the period of 2018-2023 both with original set of indicators and SDG-related set of indicators.

Stage 4. The project group based on the calculations defined the areas of the most damage caused by the war in terms of SDG in three major dimensions: economic, ecological and social.

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1 No poverty

Complete eradication of poverty in all of its forms everywhere. (13 indicators)

2 Zero hunger

End hunger, promote agriculture, and provide food for every person.(14 indicators)

3 Good health and well-being

Ensure health and provide care for everyone regardless of their age.(28 indicators)

4 Quality education

Ensure quality education that is equitable and inclusive. (12 indicators)

5 Gender equality

Eradicate gender-based discrimination and empower all women. (14 indicators)

6 Clean water and sanitation

Ensure and develop appropriate water supply and waste disposal systems. (11 indicators)

7 Affordable and clean energy

Provide access to affordable, reliable and modern energy. (6 indicators)

8 Decent work and economic growth

Provide constant and inclusive enhancement of economic activities. (16 indicators)

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9 Industry, innovation and economic growth

Develop resilient infrastructure and enhance creativity. (12 indicators)

10 Reduced inequality

Further decrease and eradicate the inequalities that exist. (14 indicators)

11 Sustainable cities and communities

Develop cities and communities that are inclusive, safe, resilient and sustainable. (14 indicators)

12 Responsible consumption and production

Promote patterns of consumption and production that are sustainable. (13 indicators)

13 Climate action

Make urgent efforts to combat climate change and its effects. (8 indicators)

14 Life below water

Protect and manage the oceans, seas, and marine resources. (10 indicators)

15 Life on land

Conserve and promote the sustainable use of land-based ecosystems.(14 indicators)

16 Peace, justice and strong institutions

Support the achievement of peaceful and constructive solid societies. (24 indicators)

17 Partnership for the goals

: Revamp and strengthen global partnerships for sustainable development.(24 indicators)

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DATA SOURCES

Ecologic passports for the regions of Ukraine by the Ministry of Environmental Protection and Natural Resources of Ukraine (https://mepr.gov.ua/diyalnist/napryamky/ekologichnyj-monitoryng/ekologichni-pasporty/)

Structural changes in the economy of Ukraine and its regions by Ukrstat (https://ukrstat.gov.ua/metaopus/2023/2_03_01_01_2023.htm)

Annual statistical report of Ukraine (https://stat.gov.ua/sites/default/files/2024-02/%D0%97%D0%B1%D1%96%D1%80%D0%BD%D0%B8%D0%BA%20%D0%A1%D1%82%D0%B0%D1%82%D0%B8%D1%81%D1%82%D0%B8%D1%87%D0%BD%D0%B8%D0%B9%20%D1%89%D0%BE%D1%80%D1%96%D1%87%D0%BD%D0%B8%D0%BA%20%D0%A3%D0%BA%D1%80%D0%B0%D1%97%D0%BD%D0%B8%202022%20%D1%80%D1%96%D0%BA.pdf)

Economic statistics by Ukrstat (https://www.ukrstat.gov.ua/operativ/menu/menu_u/sze_20.htm)

Regional reports of economic and social development of the regions of Ukraine (https://od.ukrstat.gov.ua/smi.html)

Trekker of the economy of Ukraine during the war by the Center of economy Strategy (https://ces.org.ua/tracker-economy-during-the-war/)

Demographics statistics by region by Ukrstat (https://od.ukrstat.gov.ua/stat_info/demogr.htm)

The population and its migration in Ukraine by Derzhstat (https://stat.gov.ua/uk/datasets/chyselnist-ta-pryrodnyy-rukh-naselennya-0)

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Calculating the index of sustainable development

Out of 231 indicators within SDG the open statistics cover 148 indicators, which were used in the calculations for integral index of regional development in Ukraine

The index of the regional development was calculated for 3 regions: Odesa, Mykolaiv and Kherson for the year span of 2018-2023

As not all indicators were available the methodology were adjusted to balance the index of sustainable development with its three dimensions

The methodology was adopted to track the separate SDG inputs into ISD and its dynamics for the period studied

Also major gaps of available data for indicators were defined by the project

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ODESA OBLAST

INDEX VALUE RANGE FROM 0 TO 1 AS 1 REFERS TO THE BEST AND 0 TO THE WORST VALUE OF AN INDICATOR

CHANGE IS SHOWED FROM THE MAXIMAL VALUE FOR THE PERION TO THE VALUE OF 2023 IN PERCENTAGE POINTS

Metric	2018	2019	2020	2021	2022	2023	CHANGE
IDS	0,68	0,72	0,64	0,69	0,56	0,52	-0,20
IDS by SDG indicators	0,60	0,63	0,63	0,65	0,54	0,55	-0,10
Economic indicators	0,73	0,78	0,75	0,79	0,61	0,68	-0,11
Ecological indicators	0,43	0,44	0,52	0,50	0,48	0,41	-0,11
Social indicators	0,64	0,67	0,61	0,65	0,52	0,57	-0,10

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MYKOLAIV OBLAST

INDEX VALUE RANGE FROM 0 TO 1 AS 1 REFERS TO THE BEST AND 0 TO THE WORST VALUE OF AN INDICATOR

CHANGE IS SHOWED FROM THE MAXIMAL VALUE FOR THE PERION TO THE VALUE OF 2023 IN PERCENTAGE POINTS

Metric	2018	2019	2020	2021	2022	2023	CHANGE
IDS	0,52	0,54	0,46	0,48	0,39	0,34	-0,20
IDS by SDG indicators	0,55	0,57	0,53	0,56	0,40	0,42	-0,15
Economic indicators	0,51	0,54	0,46	0,49	0,35	0,39	-0,15
Ecological indicators	0,56	0,56	0,58	0,59	0,42	0,38	-0,21
Social indicators	0,58	0,60	0,56	0,59	0,42	0,49	-0,11

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KHERSON OBLAST

INDEX VALUE RANGE FROM 0 TO 1 AS 1 REFERS TO THE BEST AND 0 TO THE WORST VALUE OF AN INDICATOR

CHANGE IS SHOWED FROM THE MAXIMAL VALUE FOR THE PERION TO THE VALUE OF 2023 IN PERCENTAGE POINTS

Metric	2018	2019	2020	2021	2022	2023	CHANGE
IDS	0,43	0,47	0,43	0,45	0,28	0,26	-0,21
IDS by SDG indicators	0,50	0,51	0,49	0,50	0,24	0,25	-0,26
Economic indicators	0,42	0,45	0,41	0,43	0,22	0,25	-0,20
Ecological indicators	0,62	0,62	0,64	0,63	0,31	0,27	-0,37
Social indicators	0,45	0,46	0,42	0,44	0,19	0,23	-0,23

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KEY RESULTS

The major setback in IDS by SDG parameters, which was caused by war refers to

SDG 3 Good health and well-being

SDG 4 Quality education

SDG 6 Clean water and sanitation

SDG 7 Affordable and clean energy

SDG 8 Decent work and economic growth

The long term effect appear to be stronger within

SDG 9 Industry, Innovation, technology and infrastructure

SDG 11 Sustainable cities and communities

SDG 16 Peace, justice and strong institutions

The SDG approach is totally relevant for developing a sustainability development measurement methodology and greatly improves the scope and focus of these measurements

The methodology for IDS can be very flexible varying from a simple averaging to a sophisticated multidimensional analysis

The citizen science approach is crucial for defining the relevance of the parameters and their weights.

The citizen science approach may be used for filling the gaps in official statistics to bring the information needed for SDG parameters

KEY FINDINGS ABOUT CITIZEN-SCIENCE APPROACH

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PROS

The methodology raises up the awareness of factors of the sustainable development among community members, policy makers and government agencies

The methodology applies a well defined and sophisticates framework for assessing sustainable development performance of regions

The methodology is flexible in its application capable of delivering assessment with around 60-70 parameters across a selection of 10-12 SDG and then improved as more parameters are available

CONS

The methodology severely relates on wage coefficient for parameters to be used in the model

The methodology can not distinguish among different causes of sustainability issues and shall be accompanied with additional research for war damages

The methodology shall be tailored specifically to a region, so that makes it difficult to make comparison. While universal approach lacks credibility in description a specific region

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THANK YOU

Environment: War Impact on Regional Development in Terms of SDG

Student`s citizen science project