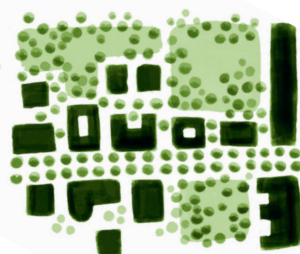
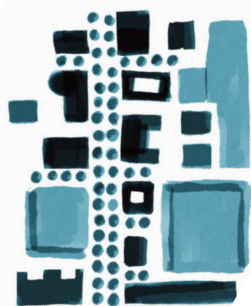
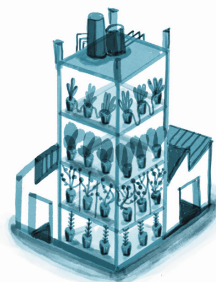




THE COLLECTIVE ECOSYSTEM GAME



Instruction Manual and resources

Bringing together landscape transformations
and "Nature's Contributions to People"

Credits

This game has been developed by Cassandra Fontana, Maddalena Rossi, Elena Tarsi, Andrea Testi, and Iacopo Zetti for the project "PHOENIX - The rise of citizen voices for a greener Europe" funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101037328.

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1. The "Collective Ecosystem Game"

1.1 Short Description

The complexity of environmental issues often hinders our ability to comprehend their relationship with human activities.

The "Collective Ecosystem Game" is a board game designed for up to 18 people that aims to tackle this issue by fostering social learning about the relationship between environmental processes and territorial transformations. First, players choose one of three diverse development scenarios, forming the teams accordingly. Second, they make decisions about the future transformations of an ideal territory. The game leverages the concept of "Nature's Contributions to People" (e.g., food, energy, climate regulation, etc.) and assumes that the territory's ability to provide such contributions depends on land use patterns. It considers the variations of Nature's Contributions to People in the urban and peri-urban areas in a radius of approximately 30 km (more details in the actions' descriptions). In each round, teams choose the strategies and interventions they want to implement by selecting one card from a small deck, actively transforming the territory's land use and influencing its capacity to provide "Nature's Contributions to People". The team that most effectively enhances the territory's ability to support human societies wins.

1.2 Setting the scene

The "Collective Ecosystem Game" is primarily designed as a tool to support participatory processes dealing with environmental issues. Its main objective is to raise awareness about the cascading impacts caused by territorial development and land use changes on the ecological system. In doing so, it stresses the

connections between different development scenarios and the provision of "Nature's Contributions to People" (NCP) in a given territory. The proposed scenarios range from a more optimistic and smart development to a degrowth-inspired future and are the following: (a) smart city, (b) post-growth, and (c) de-growth. Following a brief overview on the purposes of the game and on the concept of NCP, the facilitator will describe the three proposed scenarios. Then, players (up to 18 people) will be asked to choose one of the scenarios, forming three, or at least two, teams according to the players' choices.

a) SMART CITY

The "smart city" scenario assumes that more sustainable cities can be achieved by adopting technological and digital solutions that can foster better resource use and reduce emissions. While this change encompasses many aspects of the city, it does not imply a radical departure from current social and economic paradigms, and urbanisation patterns continue to increase.

b) POST-GROW CITY

The "post-growth city" scenario acknowledges the necessity to reduce human interferences on the natural environment. Changes in behaviours and lifestyle are deemed more relevant than technology in achieving a greener society. New urban developments are forbidden, and greenery and farming are increasingly introduced in urban spaces.

c) DE-GROW CITY

The "de-growth city" scenario is characterised by a strong

commitment towards sustainability, in a general context of reduction of the anthropic pressure on nature. Underused urban areas are dismissed, society tends to form smaller communities, and low-tech solutions are favoured over high-tech ones.

1.3 The board

Once the teams are formed, participants can start preparing the board and the pieces. Each team has 14 pieces (named with letters from A to N) representing the provision level of NCPs in a given land use configuration. The board is tripartite and allocates space for each team/scenario. At the beginning of the game, all pieces must be positioned on the letters (A-N), meaning that the provision level of NCPs is neutral. As the game unfolds, the teams decide on territorial strategies by selecting one card per round, and the pieces move forward and backwards on the board (according to the positive or negative effects of these actions on NCPs' provision levels). Each move contributes to the score. The goal of the teams is to obtain the highest score by choosing the most effective urban and peri-urban strategies. The team/scenario that first reaches the score of 15 with one piece, and has no pieces in the negative part of the board, wins. If nobody reaches this score, the winner team is the one with the higher scores after five rounds. The following list shows the 16 NCPs used for the game (derived from IPBES, 2019).

- A. Habitat creation and maintenance*
- B. Pollination and dispersal of seeds and other propagules*
- C. Regulation of air quality*
- D. Regulation of climate*
- E. Regulation of freshwater quantity, location and timing*
- F. Regulation of freshwater and coastal water quality*

- G. Formation, protection and decontamination
of soils and sediments
- H. Regulation of hazards and extreme events
- I. Regulation of detrimental organism and biological processes
- J. Energy
- K. Food and feed
- L. Materials and assistance
- M. Medicinal, biochemical and genetic resources
- N. Cultural experiences and identities

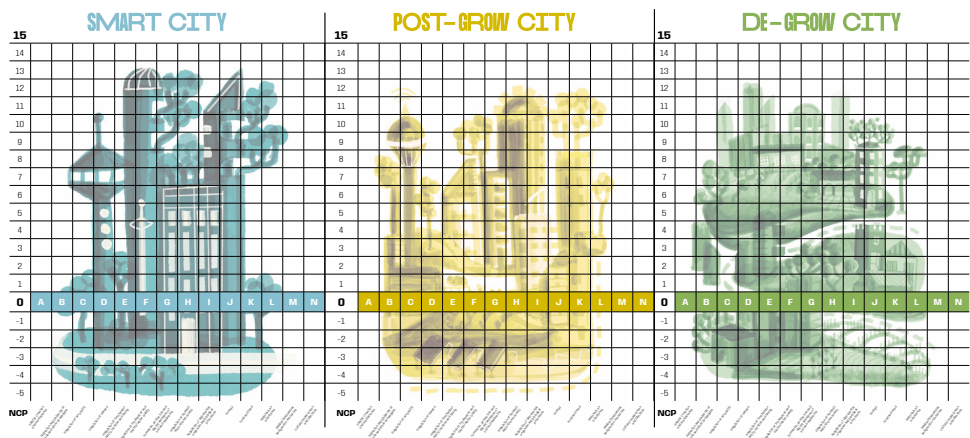


Image 1
Board

1.4 The cards

Each team has a set of 9 cards indicating different topics, or domains of intervention. When a team plays a card, the scenario associated with the team determines the strategies linked with the topic, briefly described on the card. For example, when the “smart city” team uses the “urban farming” card, the strategy is automatically the one associated with the “smart city” scenario. Notably, as NCPs are all interconnected with each other, cards have effects on all the team’s pieces (but not on other teams’ pieces). The following table shows the content of all cards:

CARD NAME <small>(each card indicates a different domain of intervention)</small>	SCENARIO <small>(each card has different effects depending on the scenario)</small>	DESCRIPTION <small>(description of the actions)</small>
URBAN GREENING	SMART CITY	Greenery is applied to buildings’ facades, roofs, and infrastructures
	POST-GROWTH	Underused urban areas are transformed into urban parks
	DE-GROWTH	Dismissed urban areas are replaced with mixed forests
SUSTAINABLE ENERGY	SMART CITY	Digital systems based on real-time data allow for a more efficient use of energy
	POST-GROWTH	Solar panels are installed in peri-urban fields
	DE-GROWTH	Peri-urban forests are cyclically cut to use wood for energy

SUSTAINABLE MOBILITY	SMART CITY	As the efficiency of logistics improves some industrial areas can be cleared
	POST-GROWTH	Green and blue infrastructures are designed to promote slow mobility
	DE-GROWTH	Slow mobility (e.g., walking, cycling) becomes the main means of transport
WATER MANAGEMENT	SMART CITY	Peri-urban basins are created to store rainwater
	POST-GROWTH	New vegetation improves the drainage of green areas
	DE-GROWTH	Dismissed urban areas are replaced with grasslands
URBAN FARMING	SMART CITY	Plantation of new trees on private land is promoted
	POST-GROWTH	Collective farms substitute most current urban parks
	DE-GROWTH	Farming production become decentralised and self-managed
URBAN FORESTRY	SMART CITY	New trees are planted along infrastructures
	POST-GROWTH	New trees are planted along infrastructures and in underused plots
	DE-GROWTH	New trees are planted in dismissed areas of the city
URBANISATION	SMART CITY	Population grows but the city does not expand
	POST-GROWTH	New urban developments are forbidden
	DE-GROWTH	Population declines and peripheries become more cultivated

FARM TO FORK	SMART CITY	As food waste is reduced, some peri-urban fields can be converted into forest
	POST-GROWTH	Agriculture is reorganised to enhance the diversity of crops
	DE-GROWTH	All private gardens are used to farm
BIODIVERSITY	SMART CITY	All rooftops have greenery
	POST-GROWTH	Some urban parks are redesigned to enhance biodiversity
	DE-GROWTH	All urban greenery and sports fields are renaturalised

Table 1

Illustrates the information shown in the cards.



Image 2

Example of the "urban greening" cards

1.5 The game

a) Preliminary phase

The first step of the game consists of a preliminary discursive phase whose main purpose is to outline the scope and the rules of the game (1). Then, the facilitator briefly outlines the concept of "Nature's Contributions to People", by using the informative materials provided (2). The next step is to describe the three proposed scenarios by reading the descriptions provided (3). On this basis, players choose their preferred scenario forming two or three teams (4), and then position all the pieces on the board, as previously described (5). Once each team has received the set of cards (6), the game can start.

b) Rounds

Each round plays out as follows: the teams choose one card each (7), the facilitator looks up in the "scoring table" the effects of the card and moves the pieces accordingly (8). At the end of the round the scores of the teams are updated (9). The game ends if all pieces have a positive score and at least one of them reaches 15 scores.

c) Debrief

The gaming activity is followed by a debrief phase where the participants can discuss the outcomes of the game with the help of the facilitator. The goal of the debrief is to make sure that all participants are aware that each action affecting land use has cascading effects on all NCPs.

PHASES	STEPS	ACTIVITY	WHO
PRELIMINARY	1	Brief explanation of the game: scopes and rules	The facilitator
	2	Brief explanation of NCPs (by using the materials provided)	The facilitator
	3	Brief explanation of the three scenarios	The facilitator
	4	Players choose their preferred scenario and form the teams	Players
	5	The pieces representing NCPs are positioned on the board	The facilitator
	6	Each team receives one set of cards	The facilitator
ROUNDS	7	Each team chooses one card	Players
	8	The pieces on the board are moved forward or backward	The facilitator
	9	The facilitator keeps the teams' scores updated	The facilitator
DEBRIEF	10	The winner team is announced	The facilitator
	11	Results are collectively discussed	All

Table 2

Recaps the phases of the game

1.6 Instructions for the facilitator

1.6.1 Scoring table

The dynamic of the game is underpinned by a calculation performed by analysing the land use distribution of a territory through GIS software. Each land use in a given territory is associated with a score that indicates the level of provision of all NCPs and, as all cards have effects that change land use, NCP change accordingly. The method of calculation is derived from the work carried out by Burkhard et al. (2009), which relates ES provision with land use and uses scores that do not refer to any context in particular. Following the adaptation from ES to NCP, this method was deemed functional for the goal of the game, which is to introduce the concept of NCP and make participants understand that each action affecting land use has cascading effects on all NCP. The table allows the facilitator to identify the score associated with all strategies and interventions. When one team plays a card, the facilitator checks the scenario chosen by team and then move all the pieces accordingly (one step forward or backwards for each positive or negative score, respectively).

1.6.2 Land use transformations

This table describes in a more detailed manner how the strategies and interventions described in the cards affect land use changes. These operations were performed through GIS software on an ideal territory, and the results were used to establish the score associated with each card and scenario. It can be shown to players on request to help clarify doubts.

2. NCP: Definitions

2.1 Nature's Contributions to People (NCP)

Nature's contributions to people refers to all the contributions that humanity obtains from nature. Ecosystem goods and services, considered separately or in bundles, are included in this category. Within other knowledge systems, nature's gifts and similar concepts refer to the benefits of nature from which people derive good quality of life. Aspects of nature that can be negative to people (detriments), such as pests, pathogens or predators, are also included in this broad category.

Nature's contributions to people can be subdivided into three categories: regulating contributions, material contributions, and non-material contributions.

a) REGULATION OF ENVIRONMENTAL PROCESSES

Nature's regulating contributions to people refers to functional and structural aspects of organisms and ecosystems that modify the environmental conditions experienced by people, and/or sustain and/or regulate the generation of material and non-material contributions. For example, these contributions include water purification, climate regulation and the regulation of soil erosion.

A. Habitat creation and maintenance

The formation and continued production, by ecosystems, of ecological conditions necessary or favourable for living beings important to humans.

B. Pollination and dispersal of seeds and other propagules

Facilitation by animals of movement of pollen among flowers, and dispersal of seeds, larvae, or spores of organisms beneficial or harmful to humans.

C. Regulation of air quality

Regulation (by impediment or facilitation) by ecosystems of atmospheric gases; filtration, fixation, degradation, or storage of pollutants.

D. Regulation of climate

Climate regulation by ecosystems (including regulation of global warming) through effects on emissions of greenhouse gases, biophysical feedbacks, biogenic volatile organic compounds, and aerosols.

Regulation of ocean acidification¹

Regulation, by photosynthetic organisms, of atmospheric CO₂ concentrations and so seawater pH.

E. Regulation of freshwater quantity, location and timing

Regulation, by ecosystems, of the quantity, location and timing of the flow of surface and groundwater.

F. Regulation of freshwater and coastal water quality

Regulation, through filtration of particles, pathogens, excess nutrients, and other chemicals, by ecosystems of water quality.

¹ "Regulation of ocean acidification" was eliminated because deemed irrelevant for land use transformations.

G. Formation, protection and decontamination of soils and sediments

Formation and long-term maintenance of soils including sediment retention and erosion prevention, maintenance of soil fertility, and degradation or storage of pollutants.

H. Regulation of hazards and extreme events

Amelioration, by ecosystems, of the impacts of hazards; reduction of hazards; change in hazard frequency.

I. Regulation of detrimental organism and biological processes

Regulation, by ecosystems or organisms, of pests, pathogens, predators, competitors, parasites, and potentially harmful organisms.

b) MATERIALS AND ASSISTANCE

Nature's material contributions to people refers to substances, objects or other material elements from nature that sustain people's physical existence and the infrastructure (i.e. the basic physical and organizational structures and facilities, such as buildings, roads, power supplies) needed for the operation of a society or enterprise. They are typically physically consumed in the process of being experienced, such as when plants or animals are transformed into food, energy, or materials for shelter or ornamental purposes.

J. Energy

Production of biomass-based fuels, such as biofuel crops, animal waste, fuelwood, and agricultural residue.

K. Food and feed

Production of food from wild, managed, or domesticated organisms on land and in the ocean; production of feed.

L. Materials and assistance

Production of materials derived from organisms in cultivated or wild ecosystems and direct use of living organisms for decoration, company, transport, and labour.

M. Medicinal, biochemical and genetic resources

Production of materials derived from organisms for medicinal purposes; production of genes and genetic information.

c) NON-MATERIAL

Nature's non-material contributions to people refers to nature's contribution to people's subjective or psychological quality of life, individually and collectively. The entities that provide these intangible contributions can be physically consumed in the process (e.g., animals in recreational or ritual fishing or hunting) or not (e.g., individual trees or ecosystems as sources of inspiration).

N. Learning and inspiration

Opportunities for developing capabilities to prosper through education, knowledge acquisition, and inspiration for art and technological design (e.g., biomimicry).

O. Physical and psychological experiences

Opportunities for physically and psychologically beneficial

activities, healing, relaxation, recreation, leisure, and aesthetic enjoyment based on close contact with nature.

P. Supporting identities

The basis for religious, spiritual, and social-cohesion experiences; sense of place, purpose, belonging, rootedness or connectedness, associated with different entities of the living world; narratives and myths, rituals and celebrations; satisfaction derived from knowing that a particular landscape, seascape, habitat or species exist.

Maintenance of options (Eliminated because deemed irrelevant for land use transformations).

Capacity of ecosystems, habitats, species or genotypes to keep human options open in order to support a later good quality of life.

Source:

IPBES (2019), Global assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Brondízio, E. S., Settele, J., Díaz, S., Ngo, H. T. (eds).

IPBES secretariat, Bonn, Germany. 1144 pages.

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SMART CITY



POST-GROWTH CITY



DE-GROWTH CITY





The complexity of environmental issues often hinders our ability to comprehend their relationship with human activities.

The "Collective Ecosystem Game" is a board game designed to address this issue by fostering social learning about the relationship between environmental processes and land use transformations.

The game uses the concept of "Nature's Contributions to People" (e.g., food, energy, climate regulation, etc.), assuming that the ability of urban and peri-urban areas to provide such contributions is heavily influenced by land use patterns. First, players choose one of three diverse development scenarios, forming the teams accordingly. Second, they make decisions about the future transformations of an ideal territory surrounding a medium-sized city.

In each round, teams choose the strategies and interventions they want to implement by selecting one card from a small deck, actively transforming the territory's land use and influencing its capacity to provide "Nature's Contributions to People". The team that most effectively enhances the territory's ability to support human societies wins.