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### ► To cite this version:

Jon Marco Church, Olivier Aimont, Emmanuel Guillon, Rémi Helder, Grichka Lévy, et al.. The project of a LTSER site Driven by civil society in the Argonne. Sustainability Research in the Upper Rhine Region, Presses universitaires de Strasbourg, 2019. hal-02377151v1

**HAL Id: hal-02377151**

**<https://hal.science/hal-02377151v1>**

Submitted on 23 Nov 2019 (v1), last revised 17 Jan 2020 (v2)

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# The Project of a LTSER Site Driven by Civil Society in the Argonne

Jon Marco Church<sup>1</sup>, Olivier Aimont<sup>2</sup>, Emmanuel Guillon<sup>3</sup>, Rémi Helder<sup>4</sup>, Grichka Lévy<sup>2</sup>, Pierre Taborelli<sup>5</sup> and Jean Grosbellet<sup>1</sup>

## Keywords

Argonne, LTSER, transdisciplinary research process, sustainability, participation

## The French LT(S)ER network

Long Term Ecological Research (LTER) is a global network that has been active since the 1980s (Mirtl et al., 2018). It promotes the long-term observation of ecological phenomena in different sites. The network also has a branch in France. One of the specificities of the French network is the emphasis not only on the ecological dimension of LTER sites, but also on their social template. For this reason, all French LTER sites are now also LTSE sites, which stands for Long Term Social-Ecological Research (Bretagnolle et al., under review). This perhaps reflects the high level of anthropization of French sites. However, this phenomenon is limited to France. Anthropogenic pressure on ecosystems is increasing at the time of the Anthropocene (Crutzen, 2006). The “S” in LTSE is also a reference to the concept of Socio-Ecological System (SES), which is gaining currency to refer to different kinds of systems where human society and environmental systems are closely coupled at various levels (Liu et al., 2007).

The French LT(S)ER network is an inter-disciplinary and inter-university network of platforms, also known in French as *Zones Ateliers* (ZA), and the sites within them, that is coordinated by the Institute of Ecology and Environment (INEE) of the National Centre for Scientific Research (CNRS). It promotes long-term observation and research to answer fundamental questions of ecology, but also to respond to societal challenges in relation with environmental dynamics at local, regional and global levels. According to data of the French LT(S)ER network, there are currently 15 LTSE platforms that are labeled by the CNRS, 13 of which are located in the mainland and 2 overseas. More than 1,500 people from more than 118 partner institutions are directly or indirectly involved in the production of the research produced by these platforms. More than 230 of the scholars involved are doctoral candidates.

## The importance of societal actors in a transdisciplinary research process

The research performed in the French LT(S)ER network is place-based and action-oriented. It aims at contributing to solve problems of resilience and sustainability. As such, it performs “research, training, and invention that can inform action for sustainable development”, i.e. so-called sustainability science (Clark, 2007). For this reason, the network’s objective is to construct its research questions, as much as possible, together with a wide range of stakeholders to ensure that research results are not only transferred to managers, but also appropriated by all relevant social actors (Kerkhoff and Lebel, 2006). Moreover, including various types of stakeholders allows to build not only on scientific knowledge, but also on practical knowledge. In this paper, we mobilize the concept of transdisciplinary research process to illustrate how knowledge is co-produced in a LTSE (Church, 2018). Transdisciplinarity should not be confused with interdisciplinarity. While

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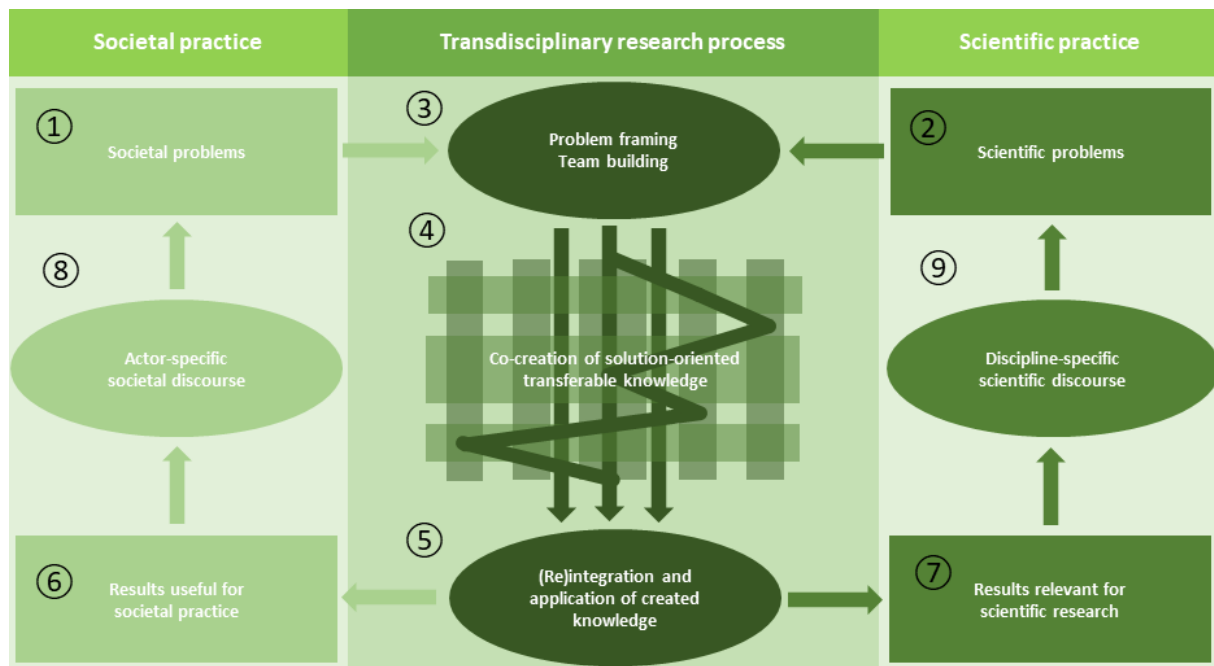
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interdisciplinarity consist in the combination of different scientific disciplines within a research process, transdisciplinarity means including both scientific and social actors in the co-production of solution-oriented transferable knowledge.

Figure 1: Conceptual model of a transdisciplinary research process



Source: redesigned based on Lang (2012, p.28)

As illustrated in Figure 1 (Lang et al., 2012), societal problems and scientific problems are the starting point of a transdisciplinary research process. They are not necessarily identical. The framing of a problem and the constitution of the team that will work to identify solutions is therefore very important, because the sharing of the problem and the legitimacy of both the scientific and the societal team are fundamental to the process of co-production of transposable and problem-oriented knowledge. This is a non-linear process that aims at the ownership and implementation of co-produced knowledge. Secondly, these results can be, on the one hand, used in societal practices and, on the other, contribute to scientific practices. They fuel both societal and scientific discourses that will then contribute to the definition of new societal and scientific problems. This iterative process brings us back to the starting point with new challenges. This transdisciplinary research contributes to what some authors describe as adaptive governance (Webster, 2009).

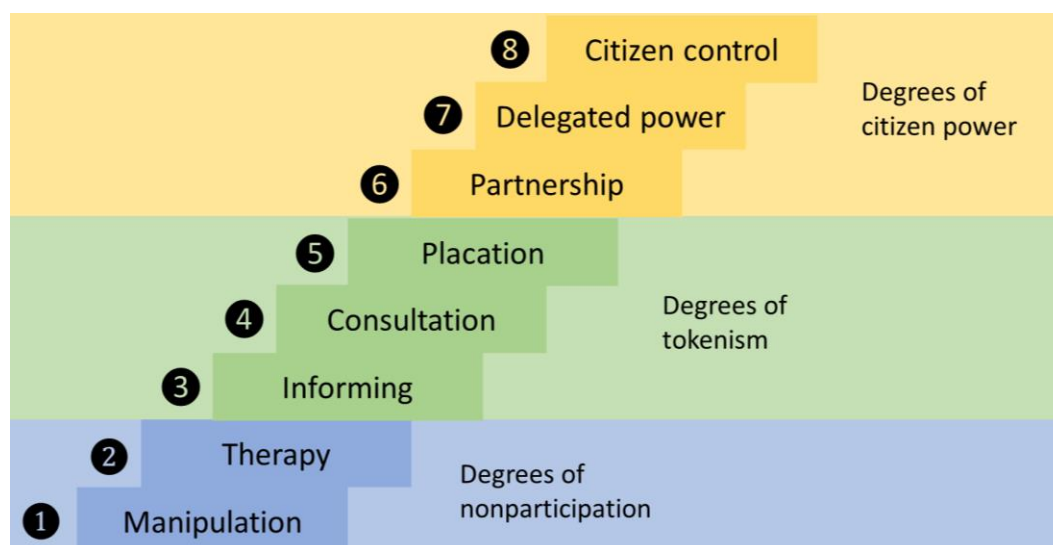
### Public participation in environmental governance

The issue of transdisciplinary research processes within LTSER sites must however be understood in the framework of science-policy relations. The relationship between scientists and decisionmakers is complex, as they are sometimes involved either directly or indirectly in decision-making (Jasanoff, 1990). However, scholars are only one kind of societal actors, alongside non-governmental organizations, which includes businesses, associations, religions and the media, well as individuals. These actors can participate in environmental governance processes alongside government organizations. They contribute to so-called public participation in environmental governance. Compared to other sectors of government such as healthcare, finance and defense, the environment distinguishes itself for a greater degree of openness to public participation at different levels, including scholars (Church and Ramcilovic, 2009). As per the 1997 Aarhus Convention, access to information, participation in decision-making and access to justice is particularly important. If the public is not aware of an environmental issue, such as pollution in a certain place or the services provided to the community by a particular ecosystem, it is as if the problem did not exist. Scientists

play a key role as legitimate informants in this regard, contributing to the awareness raising that is necessary to empower citizens and civil society.

Public participation in decision-making does not only allow to demand governments to solve environmental problems but can also contribute to improve decision-making by widening the knowledge base to include knowledge that is otherwise not necessarily available to decisionmakers that are sometimes distant from the ground. Public participation in decision-making also increases the legitimacy of decision-making processes and the ownership of the decisions. This increases in turn the likelihood of implementation and compliance. Access to justice is also important to ensure the rule of law, including in case of violation of the right of access to information and of participation in decision-making. For these reasons, public participation of civil society has become a cornerstone of environmental governance processes at all levels, including planning (Raymond, 2009). Countries around the world, including France, encourage it and adopted legislation, also within the European Union, to ensure its effectiveness. However, there are many ways to participate and levels of citizen participation (Arnstein, 1969). The lower levels of participation is manipulation, as illustrated in Figure 2. Information and consultation is also a form of public participation. In fact, government organization can sometimes act without informing the public or hearing its point of view. According to Arnstein (1969), the highest levels of citizen power are partnership, where non-governmental organizations act together with government organizations such as in the case of public-private partnership for water provision, followed by delegated power, when civil society acts on behalf of government organizations, such as in the case of a convention between a local government and a non-governmental organization for the management of a nature park. Of course, the highest level is citizen control, where civil society manages to self-organize, find locally appropriate solutions and avoids one-size-fits-all panaceas (Ostrom et al., 2007).

Figure 2 : Eight levels of citizen participation



Source: redesigned based on Arnstein (1969)

### Citizen science

The LT(S)ER network is increasingly aware of the role of civil society and citizens in the production of scientific knowledge (Muelbert et al., under review). We have already seen that the participation of civil society in transdisciplinary research processes contributes to produce solution-oriented transferable knowledge. At the same time, we live in a period of increasing skepticism towards science and scientists (De Pryck and Gemenne, 2017). Public participation in science-making also contributes to science education, in the sense that it helps disseminate and transfer scientific knowledge. Moreover, public participation in the production of scientific knowledge contributes to

increase public awareness about how science is produced, its potential, as well as its limits, with a view to increase the legitimacy of science and improve scientist-citizen relations. Last but not least, so-called citizen science allows scholars to enlarge their knowledge base with the practical knowledge of other actors. This knowledge may not be produced in a science laboratory but is the result of in situ observations and experiences. In some cases, citizens and scholars can work together to collect and analyze data, for example for the creation of species inventories or to track pollution levels (McKinley et al., 2017). This collaboration between professional and non-professional scientists can sometimes be formalized as partnerships between non-governmental organizations and academic institutions. Of course, this can represent a form of cheap labor that is exploited by scientific institutions. If this is the case, this form of citizen science usually does not last over time. For scientist-citizen partnerships to last in the long-term, cooperation must be mutually beneficial, where the process is agreeable to both parties and results are both useful for civil society and relevant for scientific research.

### The example of the Argonne LTSER project

The Argonne is a low-mountain forest located in the Northeastern part of France between the midsize cities of Reims and Metz. It used to mark the border between the former regions of Champagne-Ardenne and Lorraine. Since the merger of the two regions in 2015, they are now part of the Grand Est region. The most frequent type of land cover is forest, which represents about half of the area, followed by farmland, as well as flood meadows and peatlands. The Argonne are a biodiversity hotspot at the crossroads of major ecological corridors. The area is renowned for its forest landscape. If tourism is not really developed, the Argonne's different species and ecosystem features have long been studied by scholars, particularly from nearby academic institutions in Reims, Nancy, Strasbourg, Amiens and Paris. The University of Reims can also count upon its Center for Research and Training in Ecoethology (CERFE), which is located within the Argonne in the municipality of Boult-aux-Bois since the 1990s.

With no major city less than 30 minutes away, no urban center with more than 5,000 inhabitants and a population of less than 16 inhabitants/km<sup>2</sup>, it is among the least densely populated area in France. It represents the beginning of the so-called "empty diagonal" of France, going from the Meuse to the Landes departments. Along the urban-rural continuum, the Argonne therefore positions itself at the rural extreme and is therefore representative of the challenges faced by rural areas in France. This is also due to the destruction that took place first during the Franco-Prussian Wars and then, most importantly, during the First World War and, to a lesser degree, Second World War. The Argonne is located right next to the city of Verdun and represented the front of the First World War for most of the conflict. This left permanent traces in the collective memory of its inhabitants, as well as significant levels of soil and water pollution. The Argonne is currently undergoing several parallel labeling processes, particularly the creation of a Regional Natural Park and the establishment of a LTSER site.

Figure 3: Location of the Argonne LTSER project within the French LT(S)ER network



Source: completed based on a map by the French LT(S)ER network (2017)

### The Argonne PNR project

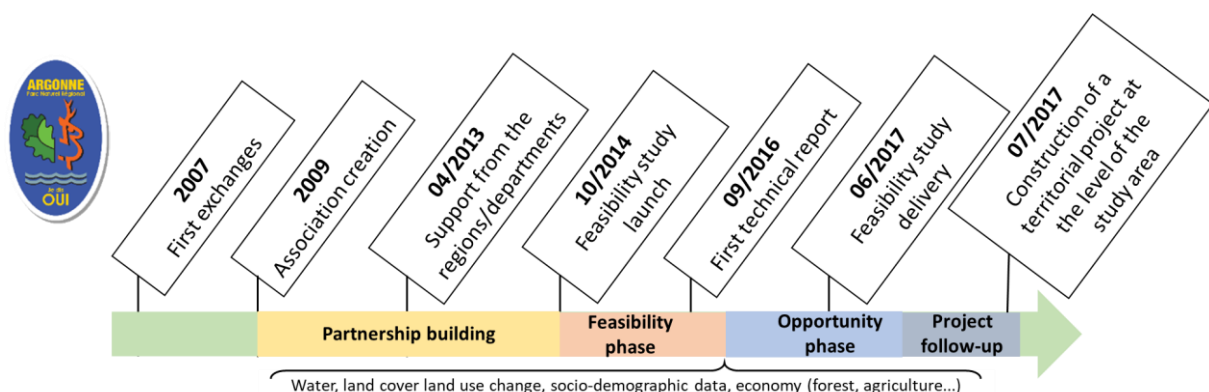
In 2007, a group of local actors, particularly civil society organizations, started reflecting upon how to encourage younger generations not to abandon the area and at the same time protect its unique natural and cultural heritage. The discussions therefore shifted from how to promote social and economic development per se to how to support the sustainable development of the Argonne also for the generations to come. By 2009, the idea to create a Regional Natural Park emerged clearly from the discussions, so the group created an association called “Argonne PNR” to promote the creation of the park. This was not an easy task because the area was split up into two different administrative regions, three departments and many federations of municipalities (in French: *inter-communalités*) and more than one hundred municipalities. The association succeeded in federating civil society organizations to pursue the common goal of the park and in mobilizing the two regions, the three departments, as well as many municipalities and federations of municipalities, which are the most difficult to mobilize in such projects because of the little awareness about the specific objectives and practical functioning of Regional Natural Parks, lack of human and financial



resources, which usually come from the regional level, as well as general resistance to change. It also succeeded at identifying a first perimeter of the park, which was defined at the municipal level based on the consideration of natural and cultural aspects. In 2013, the two regions and three departments tasked Argonne PNR and provided funding for the preparation of a feasibility and opportunity study (Lévy, 2016). This is the first formal step towards the creation of the Regional Natural Park of the Argonne, as illustrated in Figure 4. Argonne PNR decided not to contract a consulting firm but decided to hire a young professional and produce the study not only in-house but also mobilizing a large number of partner organizations, local experts and inhabitants. They all contributed to the drafting process. This enlarged the knowledge base while at the same time increasing the local ownership of the final product and of the overall process.

Argonne PNR also mobilized scholars with various disciplinary backgrounds, including both social and natural sciences, and of different levels of seniority from nearby universities and other research institutions. They included ecologists, botanists, agronomists, geographers, planners, sociologists and political scientists from nearby universities, as well as some local experts. A Scientific Committee of the association was established and met at regular intervals to provide advice and scientific backstopping to the preparation of the study, including its atlas (Association Argonne PNR, 2016). A first draft of the feasibility and opportunity study was produced in 2016. The study was then finalized and delivered in 2017. The study was also submitted to the National Biodiversity Agency, whose experts were positively impressed by its technical quality.

Figure 4: Timeline for the construction of the Regional Natural Park of the Argonne

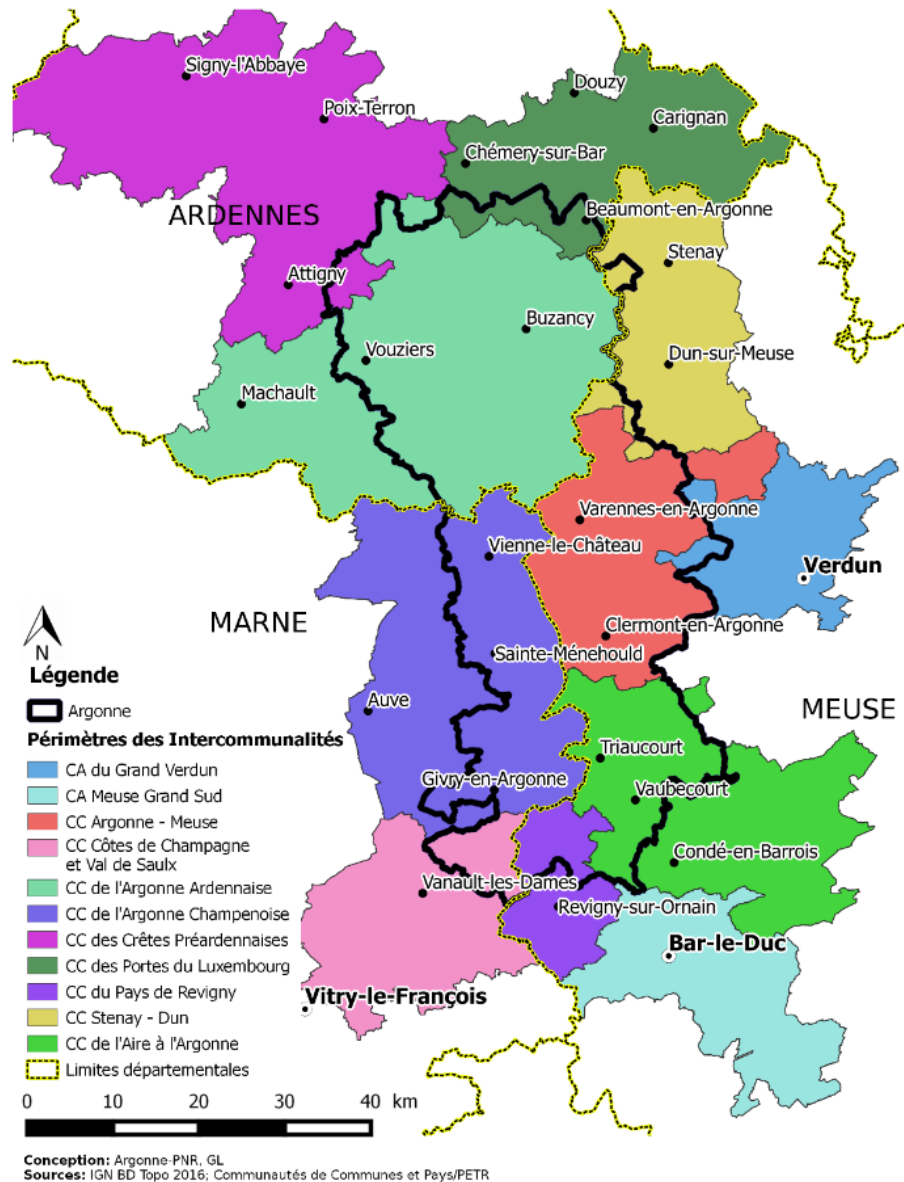


Source: original elaboration by the authors

In the meantime, the political and administrative situation changed drastically. In 2015, the Champagne-Ardenne and Lorraine regions had merged with Alsace to form the Grand Est region. The subsequent elections witnessed the departure of the center-left regional councils of both regions and the arrival of a center-right regional council. Concomitantly, the new laws in the framework of the ongoing territorial reform process resulted in the merger of some federations of municipalities, as shown in Figure 5, and transferred some competences of nature protection from the departments to the federations of municipalities. By 2016, the two regions that requested the feasibility and opportunity study did not exist anymore and the three departments that supported the process were not competent on the matter anymore. Consequently, the Regional Natural Park of the Argonne project is currently on hold. In the meantime, Argonne PNR not only delivered the study but also started implementing some pilot actions in line with what a park would do, such as producing communication materials, organizing every year a march across the Argonne, developing a brand for local products, as well as promoting local heritage and ecotourism. Supporting the development of research and innovation is also among the priorities of Argonne PNR. This is possible also because the new region, some federations of municipalities, individual donors and many volunteers keep supporting the work of Argonne PNR and the pursuit of the long-term objective of crating the Regional Natural Park of the Argonne. As between 2009 and 2013, it may take seral years for all

the federations of municipalities to concur on the establishment of the park. In the meantime, civil society is moving forward with the implementation of a de facto “citizen natural park” with the available support.

*Figure 5: Perimeter of the feasibility and opportunity study and of the federations of municipalities before and after 2017*



Source: Argonne PNR (2017)

### Participation of civil society in the Argonne LTSER transdisciplinary research process

One of the pilot actions supported by Argonne PNR is the creation of an Argonne LTSER platform, also known in French as *Zone Atelier Argonne* (ZARG) project. As shown in Figure 6, the process was initiated in 2017 in the framework of the Scientific Committee of Argonne PNR, whose members expressed the desire to build on the work done with the feasibility and opportunity study and strengthen collaboration among themselves and with Argonne PNR and its partners. Because of the availability of long-term data sets on both ecological and social aspects and because of the involvement in the activities of the French LT(S)ER network and other LTER sites of some members of the Scientific Committee, the development of an LTSER platform in the Argonne rapidly emerged as a suitable instrument to pursue the objectives of both the scholars involved and Argonne PNR.



Subsequent exchanges with representatives of the French LT(S)ER network and of some of its platforms confirmed the idea that the main features of the Argonne LTSER project are also in line with the priorities of the network, particularly regarding the inclusion of other societal actors and of social sciences alongside natural sciences.

Figure 6: Timeline for the creation of the Argonne LTSER



Source: original elaboration by the authors

For this reason, the Argonne LTSER project was designed as a transdisciplinary research process from the very beginning with the participation of societal actors in all of its phases, starting from preparation. The small dimension of the Argonne compared to some other LTER platforms and the presence of an umbrella organization such as Argonne PNR, which brings together non-governmental organizations and individuals and is supported by government organizations, facilitates the process. Table 1 shows the level of participation of civil society in the different phases of the project using Arnstein's scale (Figure 2). The Argonne LTSER project is currently in phase ④. The levels of participation indicated for phases ⑤ and above are expected based on previous experiences. This analysis is performed regarding the development of the Argonne LTSER project as a transdisciplinary research program. Of course, the same analysis can be repeated for each transdisciplinary research project conducted in the framework of the Argonne LTSER platform.

The level of participation in the definition of societal problems and in the (re)integration and application of created knowledge is high, because the region and the federations of municipalities partially delegated some of these competences to Argonne PNR, which for example facilitated the identification of the priorities of the 2017 Territory Project for the Argonne. The level is also high for the co-creation of solution-oriented transferable knowledge, because the Argonne LTSER project and other societal actors are expected to partner through Argonne PNR to identify solutions to societal and scientific problems. The level of participation in the definition of scientific problems and in the problem framing and team building phases is instead medium. For example, the Argonne LTSER project organized three public events in 2018: one in May and one in September to inform the public but also other scholars about the existence of the Argonne LTSER project and of ongoing and potential research and one in October to consult Argonne PNR and the public on the development of a Research Agenda for the Argonne, which aims at combining the main themes of ongoing and potential research with the priorities of the 2017 Territory Project for the Argonne. Forest and ecosystem issues, water resources and soil, environmental governance and military history have

been identified so far as the main areas with potential for collaboration across disciplines and laboratories. The Research Agenda for the Argonne was developed to identify the other and the demand of research for the area, identify gaps and co-produce innovative, place-based and use-inspired research projects and programs that can fill these gaps. This resulted in the identification of research gaps in terms of issues that are priority for societal actors but that are left behind by scholars, such as tourism development, as well as practice gaps in terms of questions that are raised in scientific research but that are not yet raised on the agenda of societal actors, including decisionmakers. A medium level of participation is expected to be maintained in all phases of implementation, including consulting both scientific and societal actors on the results of scientific research and societal practice, as well as informing both parties about scientific publications and societal processes.

*Table 1 : Level of participation of civil society in the Argonne LTSER project*

<b>Phase of the transdisciplinary research process</b>	<b>Level of participation of civil society</b>
① Societal problems	⑦ Delegated power
② Scientific problems	③ Informing
③ Problem framing Team building	④ Consultation
④ Co-creation of solution-oriented transferable knowledge	⑥ Partnership
⑤ (Re)integration and application of created knowledge	⑦ Delegated power
⑥ Results useful for societal practice	④ Consultation
⑦ Results relevant for scientific research	④ Consultation
⑧ Actor specific societal discourse	③ Informing
⑨ Discipline-specific scientific discourse	③ Informing

Source: original elaboration by the authors

## Conclusion

This contribution presented first the importance of societal actors within the French LT(S)ER network and their role in transdisciplinary research processes that promote public participation in environmental governance, as well as citizen science. It then discussed the level of participation of civil society in the case of the Argonne LTSER project. It showed that the project is currently being designed to ensure a high or medium level of participation in each phase. It is expected that this will contribute to solve both scientific and societal problems, will improve science-policy relations and will foster cooperation among disciplines in both the natural sciences and the social sciences, among the academic institutions, particularly within the new region, as well as other societal actors.

The Argonne LTSER platform is expected to transform this area into a living lab of sustainability. It would provide the opportunity for long-term transdisciplinary research processes to tackle the problems of rural areas and social-ecological systems such as the Argonne and contribute to their transformation towards sustainability. The research infras-structure of the French network of LTSER sites will also facilitate collaboration and allow developing joint actions and socio-ecological experiments together with other LTSER platforms in France, for instance with regard to data infrastructure, the development of shared protocols to study for example problems of public health in forest areas such as the diffusion of the Lyme disease, as well as the participation in international collaborations in the framework of the global and European LTER network.

This contribution also aimed at informing the participants in this International Sustainability Conference about the Argonne LTSER platform and at identifying scholars, particularly those from the Upper Rhine Cluster for Sustainability Research, who are potentially interested in this initiative. The

French LT(S)ER network and the Argonne LTSER platform are ideally positioned as an observatory of the Anthropocene.

## Bibliographic references

- ARNSTEIN, S. R. 1969. A ladder of citizen participation. *Journal of the American Institute of Planners*, 35, 216-224.
- ASSOCIATION ARGONNE PNR 2016. Etude d'opportunité et de faisabilité du projet de Parc Naturel Régional en Argonne : atlas cartographique. Clermont-en-Argonne: Association Argonne PNR.
- BRETAGNOLLE, V., BENOIT, M., BONNEFOND, M., CHURCH, J. M., GABA, S., GILLET, F., GLATRON, S., GUERBOIS, C., LEBOUVIER, M., MAZÉ, C., MOUCHEL, J.-M., OUIN, A., PAYS, O., PISCART, C., RAGUENEAU, O., SPILLERBERGER, T. & FRITZ, H. under review. Toward action-orientated research: the French Long-Term Social-Ecological Research network.
- CHURCH, J. M. 2018. Pathways of adaptation to climate change: analysis and transformation of the governance system of the Ardennes mountain area. *Journal of Alpine Research*, 106, [14].
- CHURCH, J. M. & RAMCILOVIC, S. 2009. Participation in the Alpine Convention. In: MAJTÉNYI, B. & TAMBURELLI, G. (eds.) *Sustainable development and transboundary co-operation in mountain regions: the Alpine and the Carpathian Conventions*. Budapest: L'Harmattan.
- CLARK, W. C. 2007. Sustainability science: a room of its own. *PNAS*, 104, 1737-1738.
- CRUTZEN, P. J. 2006. The "Anthropocene". In: EHLERS, E. & KRAFFT, T. (eds.) *Earth System Science in the Anthropocene*. Berlin, Heidelberg: Springer Berlin Heidelberg.
- DE PRYCK, K. & GEMENNE, F. 2017. The denier-in-chief: climate change, science and the election of Donald J. Trump. *Law and Critique*, 28, 119-126.
- JASANOFF, S. 1990. *The fifth branch: science advisers as policymakers*, Cambridge, MA, Harvard University Press.
- KERKHOFF, L. V. & LEBEL, L. 2006. Linking knowledge and action for sustainable development. *Annual Review of Environment and Resources*, 31, 445-477.
- LANG, D., WIEK, A., BERGMANN, M., STAUFFACHER, M., MARTENS, P., MOLL, P., SWILLING, M. & THOMAS, C. 2012. Transdisciplinary research in sustainability science: practice, principles, and challenges. *Sustainability Science*, 7, 25-43.
- LÉVY, G. 2016. Etude d'opportunité et de faisabilité du projet de Parc Naturel Régional en Argonne. Clermont-en-Argonne: Association Argonne PNR.
- LIU, J., DIETZ, CARPENTER, ALBERTI, FOLKE, MORAN, PELL, DEADMAN, KRATZ, LUBCHENCO, OSTROM, OUYANG, PROVENCHER, REDMAN, SCHNEIDER & TAYLOR 2007. Complexity of coupled human and natural systems. *Science*, 317, 1513-1516.
- MCKINLEY, D. C., MILLER-RUSHING, A. J., BALLARD, H. L., BONNEY, R., BROWN, H., COOK-PATTON, S. C., EVANS, D. M., FRENCH, R. A., PARRISH, J. K., PHILLIPS, T. B., RYAN, S. F., SHANLEY, L. A., SHIRK, J. L., STEPENUCK, K. F., WELTZIN, J. F., WIGGINS, A., BOYLE, O. D., BRIGGS, R. D., CHAPIN, S. F., HEWITT, D. A., PREUSS, P. W. & SOUKUP, M. A. 2017. Citizen science can improve conservation science, natural resource management, and environmental protection. *Biological Conservation*, 208, 15-28.
- MIRTL, M., T. BORER, E., DJUKIC, I., FORSIUS, M., HAUBOLD, H., HUGO, W., JOURDAN, J., LINDENMAYER, D., MCDOWELL, W. H., MURAOKA, H., ORENSTEIN, D. E., PAUW, J. C., PETERSEIL, J., SHIBATA, H., WOHNER, C., YU, X. & HAASE, P. 2018. Genesis, goals and achievements of Long-Term Ecological Research at the global scale: A critical review of ILTER and future directions. *Science of The Total Environment*, 626, 1439-1462.
- MUELBERT, J. H., NIDZIEKO, N., ACOSTA, A. T. R., BEAULIEU, S. E., BERNARDINO, A. F., BOIKOVA, E., BORNMAN, T. G., CATALETO, B., DENEUDT, K., ELIASON, E., KRABERG, A., NAKAOKA, M., PUGNETTI, A., RAGUENEAU, O., SCHARFE, M., SOLTWEDEL, T., SOSIK, H. M., STANISCI, A., STEFANOVA, K., STÉPHAN, P., ADRIAN, S., WIKNER, J. & ZINGONE, A. under review. ILTER - the International Long-Term Ecological Research network as a platform for global coastal and ocean observation.
- OSTROM, E., JANSSEN, M. A. & ANDERIES, J. M. 2007. Going beyond panaceas. *Proceedings of the National Academy of Sciences*, 104, 15176-15178.

- RAYMOND, R. 2009. La « société civile », ce « nouvel » acteur de l'aménagement des territoires. *L'Information géographique*, 73, 10-28.
- WEBSTER, D. G. 2009. *Adaptive governance: the dynamics of Atlantic fisheries management*, Cambridge, MA, MIT Press.