NOTE RAPIDE
L'INSTITUT PARIS REGION #29

Sylvie Castano/L'Institut Paris Region

HOW "LAND USE MAP" HELPS YOU UNDERSTAND YOUR TERRITORY

IN RESPONSE TO GROWING URBANISATION AND THE PRESSURE TO PRESERVE NATURAL, AGRICULTURAL AND FOREST LAND, PRECISE KNOWLEDGE OF LAND OCCUPANCY HAS BECOME A UNIVERSAL NEED. L'INSTITUT PARIS REGION HAS ACQUIRED PARTICULAR EXPERTISE IN THIS FIELD WITH ITS MOS[1] LAND USE APPROACH CREATED IN 1982. THIS APPROACH HAS MULTIPLE APPLICATIONS INCLUDING: THE MONITORING OF LAND CONSUMPTION, MASTER PLANNING, THE APPRAISAL OF PUBLIC POLICIES AND URBAN PLANNING DOCUMENTS, THE UNDERSTANDING OF INFRASTRUCTURE AND TRANSPORT NEEDS, ETC. THESE APPLICATIONS ENABLE THEIR MANY USERS TO DRAW UP THEIR PLANNING AND DEVELOPMENT PROJECTS. AT THE INTERNATIONAL LEVEL ALSO, L'INSTITUT DEVELOPS CUSTOMISED LAND USE PLANNING TOOLS APPROPRIATE TO ALL GEOGRAPHICAL CONTEXTS.

"The MOS is one of the tools that allow territories to be placed under permanent observation."

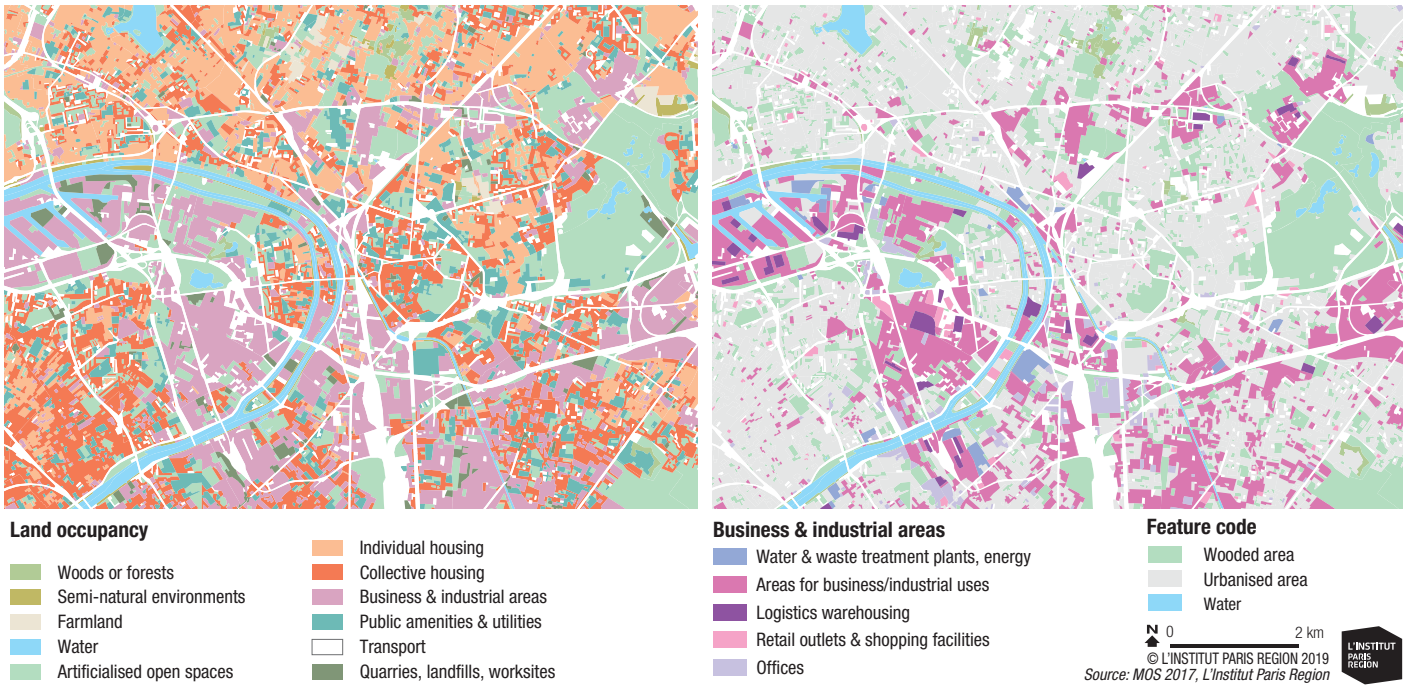
Fouad Awada
Chief executive officer
of L'Institut Paris Region

Every four years L'Institut Paris Region (formerly IAU Ile-de-France) has aerial photos taken of the entire Paris region in order to conduct a MOS, which stands for "mode d'occupation du sol" in French, consisting of aerial views followed by numerous technical studies including orthophotography, photointerpretation, etc. Indeed, in the field of spatial planning, the spatial occupancy of land and changes thereof are key inputs as they reflect the population's living environment and lifestyles as well as territorial balances. Thus, knowledge of land occupancy ensures that development projects are better defined and therefore planned in a timely way. A panel discussion held at L'Institut Paris Region in February 2019 brought together major players – institutions, local authorities, urban planning agencies, etc. – to discuss the use of MOS as a tool for understanding territories and identifying the various underlying dynamics at work on different scales ranging from the sub-municipal to the regional.

MAPS AND DATA FOR VISUALISING AND UNDERSTANDING

Above all, one of the main uses of MOS is to make a territory visible by providing a means of discovering its spatial organisation. This can be done quite conventionally by using maps. By indicating where most types of land occupancy are located, MOS provides a picture of a geographical space and can do so on different scales of analysis. Thus, they provide a quick and educational reading of spatial occupancy at a given moment. This visualisation is very useful

A land use map with several possible uses



for a dialogue with the general public or with players who don't have a good knowledge of the territory in question. Consequently, a map (possibly accompanied by data visualisation) provides an efficient and relevant basis for illustrating a speech or introducing a debate. "Creating a land occupancy map is an opportunity to (re)discover your territory", stresses Christian Thibault, director of L'Institut Paris Region's Environment department. The MOS may also be in the form of an overview table (showing the surface areas, relative shares of wooded and natural spaces, business parks, housing areas, etc.) that presents space allocation in quantitative terms, thereby helping to assess the balance between functions or the efforts that need to be made to achieve this balance.

Such an inventory, which covers the entire regional space, makes it possible to study different scales in order to compare your territory with neighbouring territories or to place your territory in a broader framework (regional, intermunicipal, county, employment area, large geographical entities as in the Paris Region's Master Plan[2], etc.). The inventory's nomenclature also allows national or even international comparisons to be made. Such interlocking helps free us from administrative limitations, thereby sometimes allowing new insights into the territorial dynamics at work. This benchmarking also makes it easier to contextualise ideas or to put preconceived ideas into perspective. As made clear by Dominique Mestressat-Cassou, a research officer in the Base-Mapping and Geomatics department of the Lille Métropole Urban Development Agency, having access to consistent data "is very useful, not only for making comparisons, but also for understanding each other better".

The wealth of information provided by the MOS lies in their very detailed nomenclature and the great number of possible groupings (resembling a game of Russian dolls): by featuring between 11 and 81 legend items, they make it possible to report information that meets the highest expected quality of analysis. The "simplified" version of a MOS is used as a background for map displays (see above), "a basic but very useful feature", says Jean-Christophe Rigal, deputy director responsible for knowledge and forecasting at Yvelines County Council. This tool is adaptable in terms of scale and content, so we can create backgrounds that meet a range of thematic or cross-cutting requirements. Thus, the regulatory map for the 2013 Paris Region's Master Plan featured a MOS grouped into five items. "The simplified MOS is a basic map that is easy to understand, which we often use when talking to elected officials", says Laurence Debrincat, head of forecasting and studies at Ile-de-France Mobilités (the Paris Area Public Transport Authority). The use of more detailed versions of the MOS tool is particularly useful for finer-grained and more complex thematic and spatial analyses. For example, the matching of "housing" or "business" areas with various urban forms (see the infographics on p.3) allows us to develop building typologies on a municipal scale, thereby enhancing the diagnosis made in planning documents, landscape studies, thoughts on development densities and definitions of a territorial framework.

"The MOS makes us think of and raise questions about territories. It's a valuable tool because it makes the invisible visible."

Jean-Christophe Rigal
Deputy director responsible for knowledge and forecasting at Yvelines County Council

A KNOWLEDGE BASE FOR ANALYTICAL PURPOSES

By cross-referencing the geographical information supplied by the MOS tool with several elements of statistical data, summary indicators can be created that more effectively help to visualise a territory's

Typology of housing and business parks in a selection of municipalities in the Paris Region

composition and organisation. A summary of this information can thus be made and incorporated into a single map.

For example, in order to identify centralities and understand how the territory functions for the purpose of drawing up the Roissy Pays de France Territorial Development Master Plan (SCOT), several indicators were compared based on units measuring 250 m × 250 m (see the infographics on p. 5):

- human population density: concentration of population and jobs in the urbanised areas identified by the Mos;
- the presence in the urban unit of a centrality (based on an inventory of Paris region facilities, an indicator of spaces that create a "town centre" effect [Mangeney, 2014]);
- the presence of a station within the urban unit and its catchment area (800 m radius in the outer suburbs of Greater Paris).

The results of this approach provide a view that complements the more sectorial analyses of population trends, on the one hand, and of job or transport trends, on the other. Moreover, the focus on the urban fabric and on the density effect due to the various classes highlights the reach or impact of these central areas.

The expertise acquired by L'Institut Paris Region is also exported to several other parts of the world (Morocco, the Philippines, Polynesia, etc.) in order to support the efforts of very diverse territories to develop their planning activities by adapting the key items to the local context, such as deserts or lagoons, for example.

Thus, L'Institut Paris Region has helped French Polynesia draw up its overall master plan (SAGE) and produce a MOS adapted to the key issues in the five archipelagos, namely: the islands of la Société, Australes, Tuamotu-Gambier and Marquesas. A specific nomenclature comprising 17 items (see opposite) was drawn up based on the field knowledge of the Polynesian players and aerial photographs when available. This collective work formed the basis of the production of 18 poster maps, which were presented during workshops. This new knowledge base made it possible to analyse the consumption of space over the last 10 years. Such expertise has highlighted the territory's strengths and weaknesses in terms of drawing up development scenarios as part of the PADD-Sustainable Urban Development Project. The creation of this new data base ensures not only a coherent tool for interpreting the territory, but also, and above all, provides a relevant analytical tool for monitoring land use that suits the various scales existing in the Polynesian archipelagos.

Nomenclature with 17 items
adapted to Polynesia

Natural spaces

Land
- Tall vegetation
- Low vegetation
- Mineral
- Mixed land

Aquatic
- Lagoons and reef flats
- Fresh water
- Mixed aquatic

Man-made spaces

Urban
- Individual housing
- Collective housing
- Mixed urban areas
- Business parks
- Public facilities
- Transport infrastructure
- Bare land

Agricultural
- Forestry
- Farmland
- Aquaculture

A MONITORING AND EVALUATION TOOL

A MOS reviews the main changes that have affected a territory. Since the launch of this inventory in 1982, nine updating campaigns have been conducted with rigorous geographical and methodological continuity. It has become a very important reference tool used for regular monitoring of space consumption over the long term. This long-term view has made it possible to monitor the planning cycles and to assess the impact of public policies on the consumption of land. Limiting the consumption of space is a major urban planning and development challenge. Thus, local urban development documents are required to assess space consumption over the last 10 years. One of the main purposes of this assessment is to quantify the amount of natural, agricultural and forest land that has been consumed. To meet this complex requirement, a MOS is one of the few tools available. It is based on a shared definition of space

AN EXAMPLE OF **USING A LAND USE MAP (MOS)**

I NEED A MOS

To monitor the dynamics of the changes in open urban spaces as part of the monitoring and assessment of my planning document.

To know which areas are at risk of flooding so as to enable me to draw up my Local Urban Development Plan (PLU)

HOW CAN A MOS HELP ME?

- **Thanks to their level of detail,** MOS help to distinguish between the extension of surface areas and the renewal of existing surface areas.
- **Thanks to their very fine blanking,** MOS also permit aggregations based on different geographic scales for enhanced understanding of the dynamics.
- **Its temporality** ensures regular monitoring in order to compare and analyse changes.

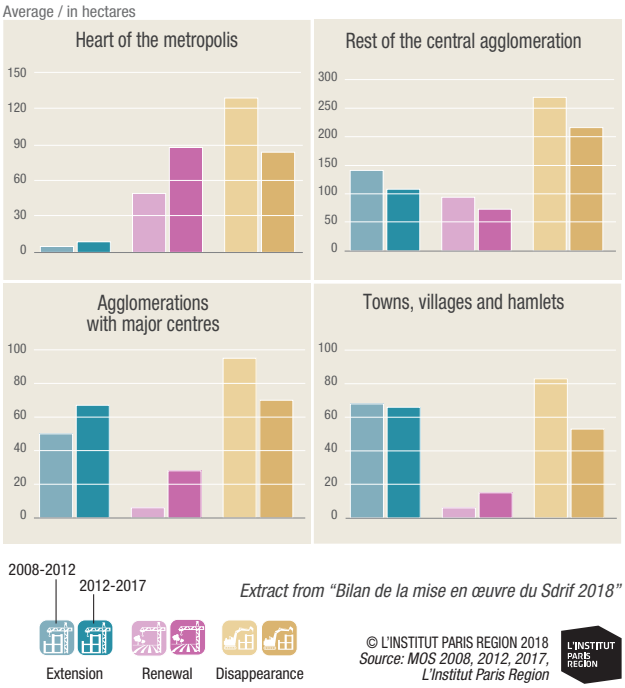
- **The geo-referencing** of a MOS makes it possible to compare them with other sources of information, such as dataon potential flood risk areas.
- **Mapping that shows the urbanised areas impacted** by this risk is thus possible and applicable to various specific cases, such as inhabited areas, business parks or stations at risk of rising water levels.
- **Numerical data** (surface areas, population trends, type of space impacted, etc.) may also be produced.

WHAT TYPE OF DELIVERABLE?

Infographics for evaluation purposes.

A map for locating purposes.

The dynamics of changes in surface areas occupied by open urban spaces (comparing the periods 2008-2012 and 2012-2017)

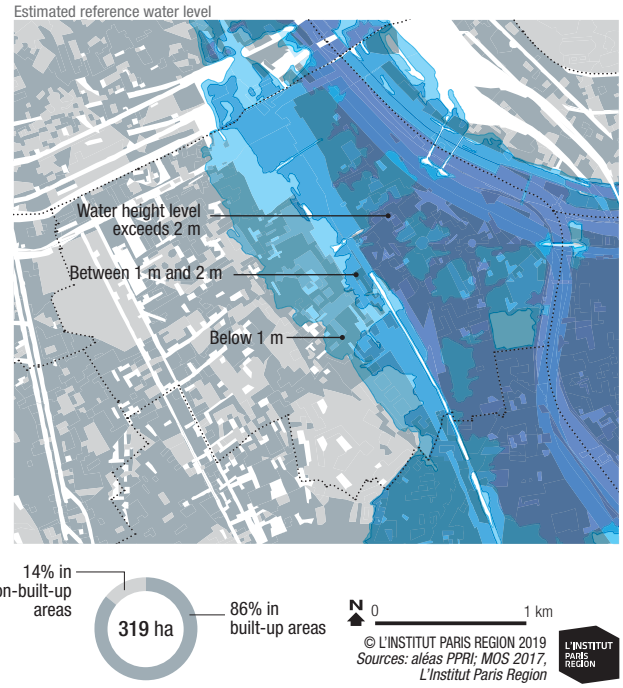


Extract from "Bilan de la mise en œuvre du Sdrif 2018"

Source: MOS 2008, 2012, 2017, L'Institut Paris Region

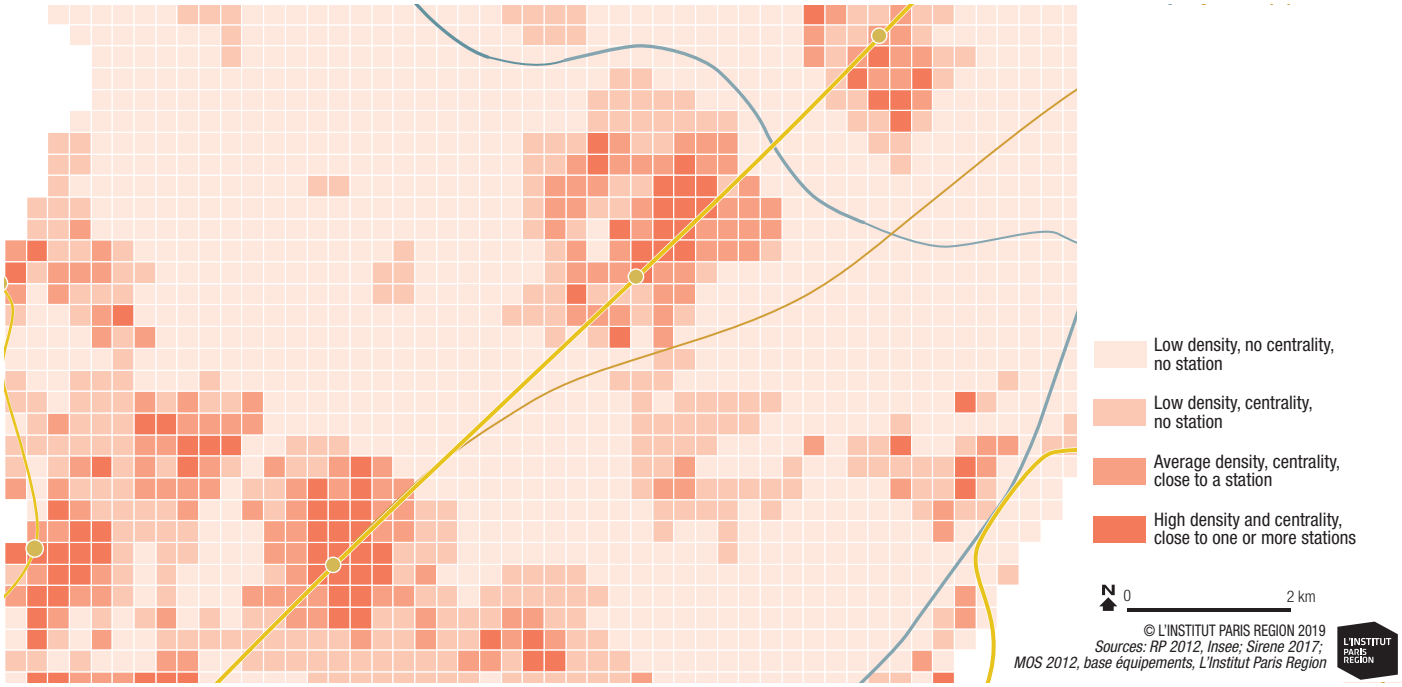
54% of the municipality at risk of flooding

44% of the population potentially impacted



Sources: aléas PPRI; MOS 2017, L'Institut Paris Region

Extract from studies for the Territorial Development Master Plan of Roissy Pays de France (north-west of Paris)



consumption, *i.e.* "the consumption of agricultural, wooded and/or natural space between two dates by means of soil artificialisation". It ensures the existence of "a common language", according to Rita Ceccherini, the head of planning at the Roissy Pays de France Agglomeration Community.

Its use in various planning documents at regional, territorial (SCOT-Territorial Development Master Plan, PLUi-Intercommunal Cooperation Urban Development Master Plan) or local scales (PLU-Local Urban Development Plan, municipal map) makes it possible to monitor the fulfilment of the goals and quantitative objectives set. The resulting indicators provide keys to understanding the data common to all the players involved. "The MOS provides figures and analyses common to all regional partners," specifies Matthieu Ecoiffier, who works for the Interregional Department of the Ministry of Public Works and Planning (DRIEA). Thus, when assessing the results of the implementation of the Paris Region's Master Plan, almost one third of all the indicators used rely on the MOS. These indicators have been defined by thematic working groups of representatives of the State, the Region and regional experts. These indicators have played a pivotal role in the production of the first assessments of the master plan by calling into question the extent to which its main objectives have been achieved. Among these objectives were: to rebalance the Paris Region, foster urban intensification, manage natural resources sustainably, etc.

Furthermore, when cross-checked with other data bases, the MOS helps to construct other indicators that are indispensable to environmental assessments or to the monitoring of sectorial documents. This makes it possible to keep track of trends in the fragmentation of natural spaces by large-scale infrastructures (see the Évolumos data base), and of trends in the spread of highly sealed surface areas (urban morphological districts) or in the densification of homes in station districts (Densibâti database). These indicators may be used by several documents on a regional scale. A good example of this is the indicator showing the share of open spaces affected by the main protections from planning initiatives. Designed to monitor the implementation of the Paris Region's Master Plan regarding the conservation of protected spaces, it is also used to assess the implementation of the Regional Scheme of Ecological Coherence (SRCE) in terms of the functional utility of ecological networks. "The MOS is a precision instrument and thus a favoured means of creating indicators", asserts Olivier Denert, Head of Planning within the Territorial Cohesion department of the Paris Region Council.

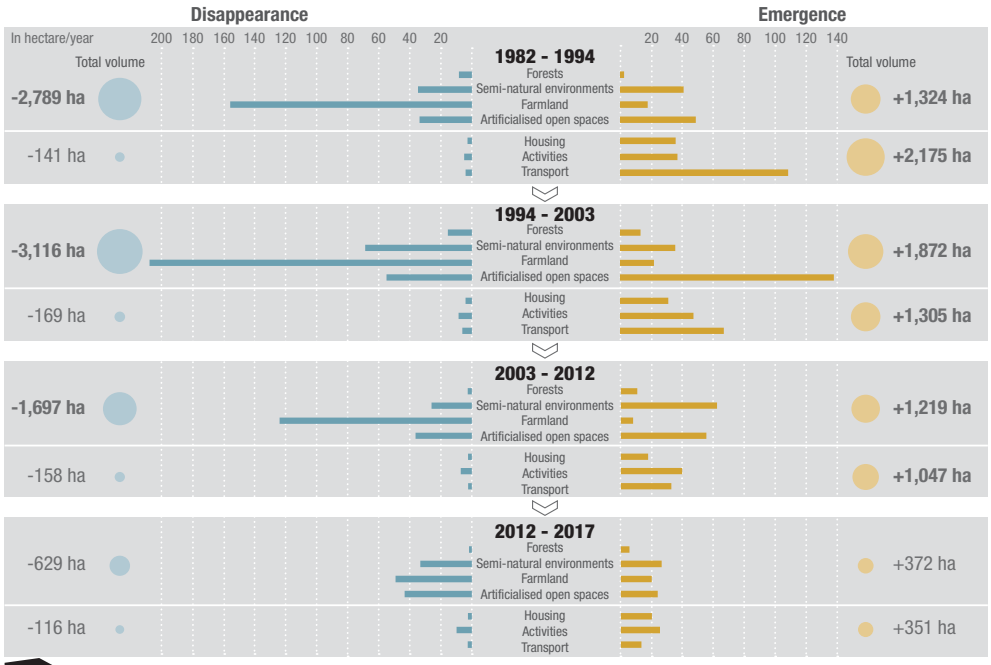
A THOUGHT-PROVOKING AND FORWARD-LOOKING INSTRUMENT

In addition to analysing and monitoring land occupancy, the MOS is a tool that also provides forward-looking studies. When checked against population trends and employment indicators, it is the basis for mobility studies. For example, it works on a regular basis with the Île-de-France Mobilités Agency regarding the location of the future railway stations for the new transport lines. The cross-referencing of data combines residential population growth estimates with simulations of employment trends and knowledge of urbanised spaces. "Our approach is different, as it's based on monitoring movements and flows. It provides us with data for studying the services provided to challenging territories," says Laurence Debrincat. Thanks to the MOS tool, we can consider not only what exists, but also changes over more

"We drew up our draft Territorial Development Master Plan (SCOT) after studying the collective spaces ('polarities') identified by the MOS."

Rita Ceccherini
Director of urban planning at the Roissy Pays de France Agglomeration Community

The MOS items that have changed the most in the territory of Roissy Pays de France



Source: MOS 1982, 1994, 2003, 2012, 2017, L'Institut Paris Region

"The MOS is used at every stage in Territorial Development Master Plan (SCOT) for diagnostic purposes, but also for assessing space consumption."

Rita Ceccherini

than 30 years, which allows us to refine our simulation models and scenarios. In view of this more forward-looking outlook, the MOS can also stimulate collective thinking. L'Institut Paris Region tackles more exploratory issues as well, for which the MOS provides a solid knowledge base and a relevant working base featuring the definition of a new division of urban morphology, mapping workshops to test new forms of representation, or 3D simulations on a regional scale. These tasks provide opportunities to collectively redefine the tool's limits and the ways and means of improving or complementing it.

Since its establishment in 1982, L'Institut Paris Region has successfully changed the MOS on the basis of regional challenges and to meet the needs of the players involved in planning. Changes in digital tools open up new possibilities for L'Institut Paris Region to produce high-performance indicators linked to the new challenges, notably environmental. The deployment of 3D modelling, access to new sources of Information (digitisation of local urban planning documents), the cross-referencing of little-used data, are all areas worth exploring in order to create new combinations and trends in the use of MOS. ■

Muriel Adam, architect & urbanist, **Thomas Cormier,** urbanist
Planification Department *(Sandrine Barreiro, Director)*
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1. Mode d'occupation du sol.
2. Schéma directeur de la Région Ile-de-France (SDRIF).

RESOURCES

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- Mangeney Catherine, *Les polarités d'équipements et services en Île-de-France,* IAU îdF, juin 2014.
- "Mos 1982-2012. De la carte au territoire. Volume 2", *Les Cahiers,* n° 169, IAU îdF, juin 2014.
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The persons mentioned in this *Note* were the expert guests who took part in the panel discussion held on 13th February 2019 at L'Institut Paris Region on the following topic: "Analysing, deciding, planning: how MOS (Land Use Map) can help you understand your territory".

CARTOVIZ

To support urban planning players, L'Institut Paris Region, *via* its Cartoviz data visualisation tool, provides an interactive Land Use Map featuring either 11 or 24 captions. You can also download free of charge a data sheet that includes a summary table and a map.

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ISSN 2555-7165
ISSN online 2497-126X

www
institutparisregion.fr/en