



Southern coast of the Buenos Aires metropolitan area: planning for adaptation and mitigation

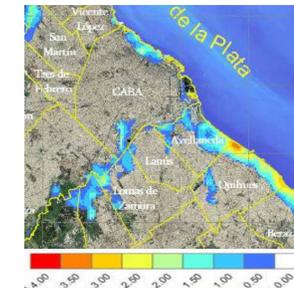
The study area lies on the south-east part of Metropolitan Buenos Aires. It has traditionally been more industrial and less developed than the wealthier north-west, mostly because of the extensive wetlands of the coast, considered unhealthy. Most of the many informal settlements lack sewers and are built on unsuitable land (mostly flood-prone areas). The extensive wetland that lies east of the highway connecting with La Plata city is still mostly undeveloped due to frequent flooding. A new mixed-used high-income neighborhood, next to a 400Ha former landfill has been proposed in part of the coast although major changes to the landscape should be made to make this possible. There are great societal concerns about the impact of this kind of development. Gated neighborhoods have been built polderizing the housing areas. Many industries have traditionally set in the area that has today an important historic industrial heritage. The highway has attracted the building of malls and big supermarkets. The built area is expected to consolidate and densify and the urbanized area is expected to grow. (Lanfranchi et al, 2018)

Sea Level Rise and Flooding

In the considered area the likely impact of sea level rise and climate change is that the return periods of floods will become shorter. On the average, floods can be expected every year over a large coastal area in the south of the Metropolitan Buenos Aires (Barros, V., 2005).

River height over normal levels (m)

2070 – 2yr return period



Lecertua, E. Análisis de Riesgo de Inundaciones en las áreas costeras del Rio de la Plata considerando cambio climático. Facultad de Ingeniería. UBA. 2010

Major Requirements by 2050

- Additional 250.000 dwellings will be needed by 2050 to serve 1mill. people in the area.
- The study area will have an increase in the frequency of flooding, so the wetlands shouldn't be developed.
- Densification will occur in the already developed areas substituting old houses with high rise buildings.
- Atmospheric and stream pollution will increase
- Green infrastructure will face a lot more pressure for land use change.

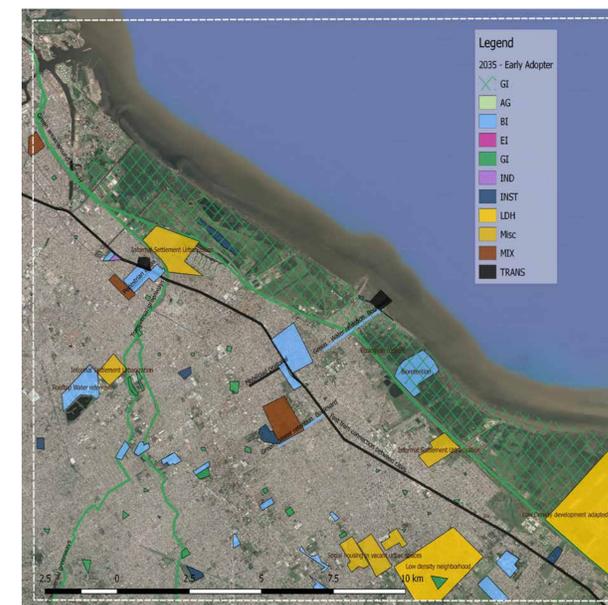
Major assumptions and innovations

- MIX 2035 1 Mixed use development
- MIX 2035 12 Innovation
- MIX 2035 14 Sustainable Neighborhood Pattern and Design (Mixed-Use Neighborhood centers)
- WAT 2035/2050 2 Water Retention
- WAT 2035 8 Bioretention
- GRN 2035 17 | Green infrastructure for coastal resilience
- GRN 2035 13 | Regaining the riparian ecosystem
- GRN 2035 4 | Linear vegetated corridors as linear parks
- AGR 2035/2050 10 Urban Farming – Urban Agriculture

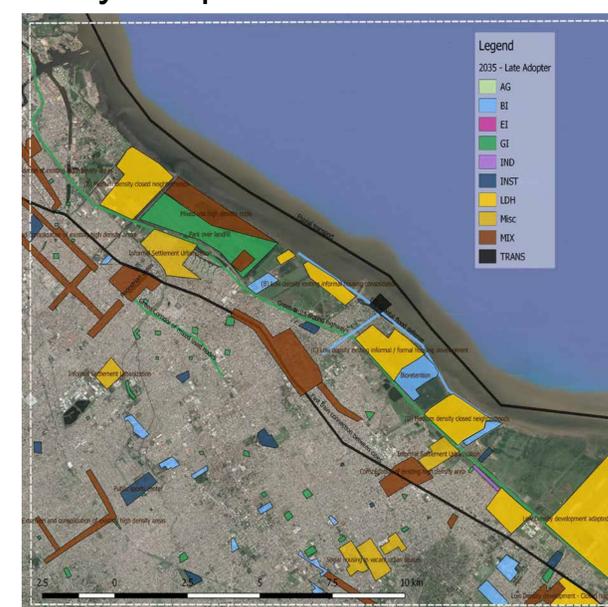


Existing situation 2020

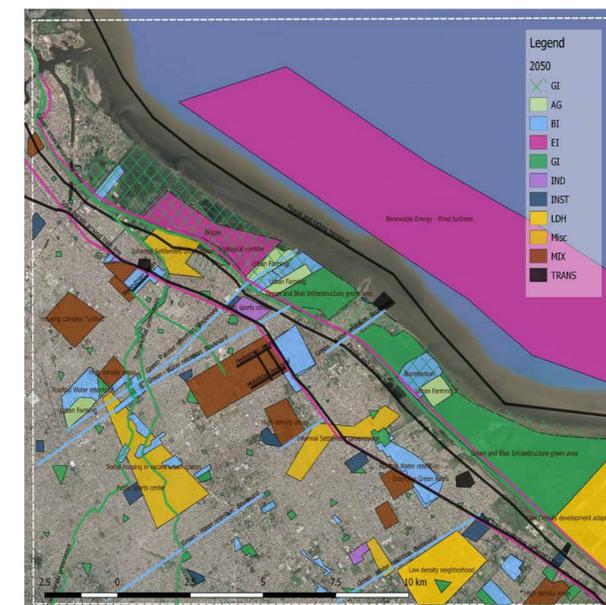
Heavy and polluting industries have been moved away from the housing areas and the land use has changed to either medium density development or GI. Small scale industry clusters (light or additive) are set in formerly heavy industry sites near mixed high-density development. An innovation district is proposed for an area near Buenos Aires city. Big scale retail is set along the highway although the area assigned to them is not as large as in the non-adopter scenario because other retail modes are preferred. Renewable, on-site energy production is encouraged and wind turbines are set in the Rio de la Plata river shallow bed. On part of the railway and highway associated land solar panels are laid. Biogas produced on the former landfill below the metropolitan park is also used as energy. Green spaces at the neighborhood level are uniformly distributed along with public sports facilities. Special areas with metropolitan scale facilities for people to perform social activities are proposed in formerly military areas. Finally, new forms of city management are incorporated and the use of sensors and automation inform decisions on an everyday basis, especially regarding mobility.



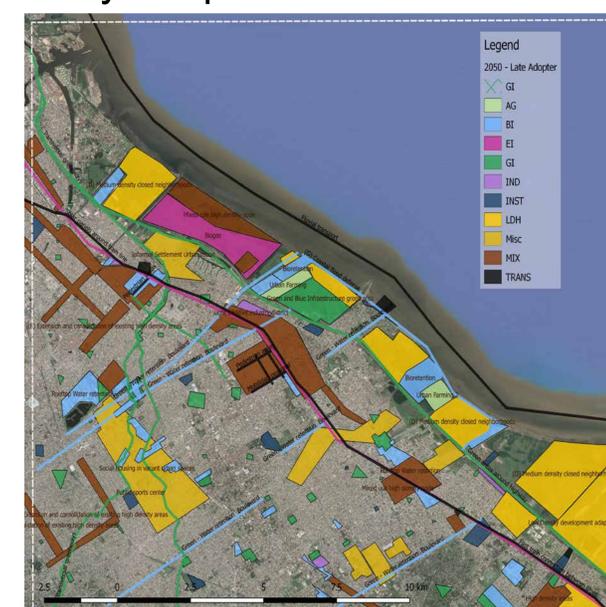
Early adopter 2035



Late adopter 2035



Early adopter 2050



Late adopter 2050

Early adopter scenario

In this scenario the areas that are already dense are consolidated, water management measures are mandatory for new construction or renewal. The widest streets in the area are set to collect, temporarily retain and/or infiltrate water. The streams are open and most of the informal settlements on the alluvial plains have been moved to more suitable areas, mostly to formerly industrial space. Low-density development is limited and high density on suitable, already consolidated areas is preferred. New gated neighborhoods are not allowed because of the large changes needed on the open areas. A policy restricting housing on the flood-prone area is set early and new development isn't allowed. Most of the undeveloped area North-East from the highway is kept as GI. No coastal flood defense is set and the relatively more frequent flooding is not affecting the people because adaptations like still houses allowed the already settled areas to cope with it. Some areas are dedicated to urban agriculture. Small community vegetable gardens are spread along the railway and highway. Transportation nodes allow for change between boat, bus, train or bike commuting modes. Pedestrian streets are also established in the mixed-use areas along with bicycle exclusive lanes.

Late adopter scenario:

In this scenario the areas already planned for dense development have been consolidated and densified. The coastal defense has been set in place allowing development to take place in flood-prone areas, although not as much as in the non-adopter scenario. Water management on site is mandatory for new buildings, and small treatment plants are scattered. Green infrastructure consists of two metropolitan scale parks and a network of small green spaces that were mostly set in place after the land-use change of big plots of land, so the distribution is evenly distributed on the less dense south-east. Much of the heavy industry has moved away from the densest parts of the city to industrial parks farther away. The informal developed areas have been urbanized and some of the people inhabiting the unsuitable land have moved to social housing. Transportation is the same as in the other scenarios although the nodes mostly coincide with today's ones. Energy is generated off-site although the park over former landfill is used to get biogas and renewable energy harvesting is encouraged on new buildings. An area for urban agriculture is set on the coast and smaller gardens are spread on former industrial sites.



Dense mixed use development



Wide streets



Urban stream



Modified coast



Low density area (Ranelagh)



Highway to La Plata city



Highway to Mar del Plata city



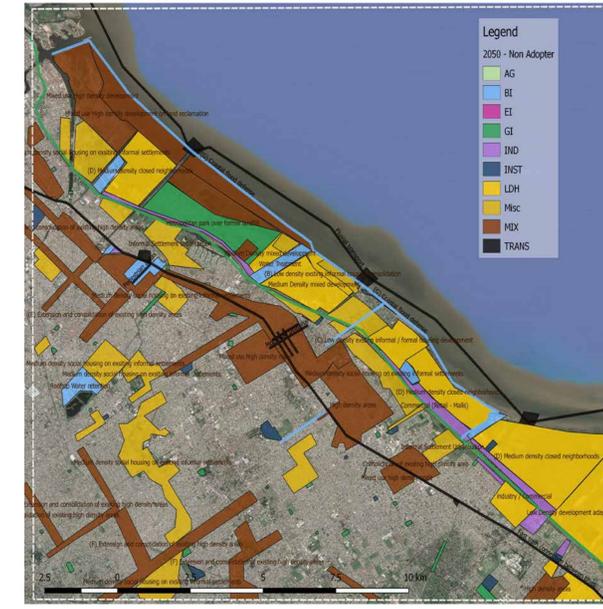
View of the densely developed area from the former landfill



Urban fringe



Social housing



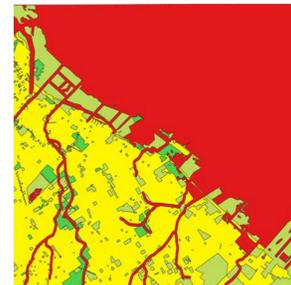
None adopter 2050



Informal settlements - 2020



Informal settlement - Avellaneda



Water infrastructure

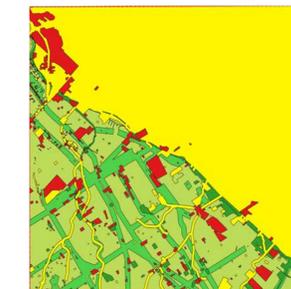


Agriculture

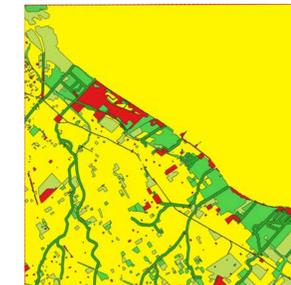
Evaluation maps - existing situation 2020



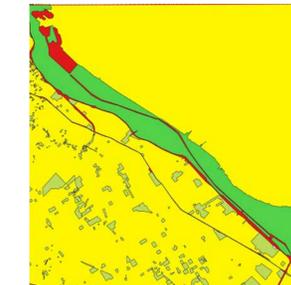
Transport



Industry

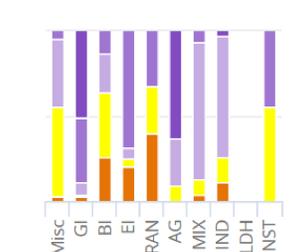


Green infrastructure

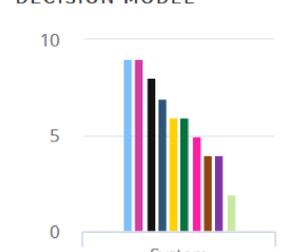


Energy infrastructure

IMPACT SUMMARY



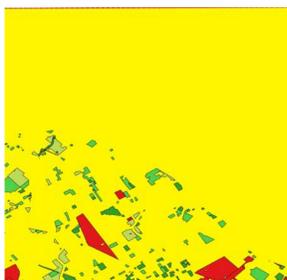
DECISION MODEL



Early adopter 2050 - Impact summary and decision model



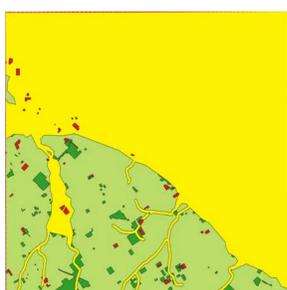
Early adopter visualization - 2050



Low density residential



Mixed development



Informal settlements urbanization



Institutional



Combined impact map / early adopter 2050

Non-Adopter Scenario

Green infrastructure consists in smaller (typically 1Ha or less) and fewer green public spaces. A metropolitan park over the former landfill is the only big GI area. A long coastal flood defence with regularly spaced pumping stations have been set along the coast. Cut and fill earthworks allowed for the development of the green open areas between the river and the highway. Part of the green open space beside the river in 2020 was taken up by high density mixed development (a project already pushing for approval) and a new area has been added by land reclamation (a historical way of gaining more land in Buenos Aires). Other parts of the formerly green areas are now low-density housing (gated neighbourhoods) or urbanized informal settlements.

In general, the areas already planned in 2020 for medium or high-density housing and commercial land-use have now high density, with a gradient of density lowering from north-west to south-east.

Industrial areas near Buenos Aires city turned into dense housing (if the area is already densifying), low-density housing or into informal development. On the land beside the highways big scale retail is set and encouraged. Regarding Blue infrastructure, new buildings on former industrial areas are required to retain the rain-water and / or install green roofs.

Most of the informal settlements existing in 2020 are already urbanized, although in the same site (after cut & fill) and became medium density housing. Other open areas in 2020, the ones farther from the City of Buenos Aires, has been occupied with informal settlements.

Energy is generated off site and few new buildings have some sort of on-site renewable energy generation to complement that coming from outside.

There are few and very small areas with urban farming, and the land formerly used for agriculture (South-east corner of the study area) is now low-density housing (either gated or open neighbourhoods).

Pedestrian areas are few and concentrated in the densest parts. A fast fluvial transportation line is set, although is very expensive so it is used mostly by gated neighbourhoods dwellers commuting to Buenos Aires downtown. There is a fast train connection between Buenos Aires city and La Plata city. Transportation nodes are on the new development by the river and in the main train stations. Most of the transport is done by car, although public transportation have been improved by setting exclusive lanes on the major roads.

Blue infrastructure is not well developed. Most of the streams are covered. Big and expensive subterranean channels have been built to deal with the excess of rain.

Sources:

Background Imagery: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community | Earthstar Geographics / Google
Local GIS Sources: ARBA - Instituto Geográfico Nacional

Lanfranchi, G., Duarte, J. I., y Granero Realini, G. La expansión de los Grandes Aglomerados Urbanos argentinos. Documento de Políticas Públicas /Recomendación N°197. Buenos Aires: CIPPEC.

Barros, V. Global Climate Change and the Coastal Areas of the Río de la Plata. A Final Report Submitted to Assessments of Impacts and Adaptations to Climate Change (AIACC), Project No. LA 26. 2005

Participant team credits
 Lic. Fabio Marquez - UMSA
 Lic. MLA. Damián Pérez - FAU-BA
 Lic. Martín Simonyan - FAUBA
 Lic. Valeria Micou - FAUBA
 Lic. Magdalena Rufino Cayssials - FAUBA
 Dr. Ing. Agr. Daniel Laureda - FAUBA
 Lic. Julieta Ceballos - FAUBA
 Lic. Laura Cazorta - FAUBA
 Arq., MPUR. Raquel Perahia - FADU UBA
 Lic. Sebastián Altamiranda