Urban Planning Tools as Agents of Change:

Collaborative Spatial Data for Sustainable Urban Development in Indonesia

December 16, **2020**

World Bank City Planning Labs & CAPSUS

Project

Urban Planning Tools as Agents of Change: Collaborative Spatial Data for Sustainable Urban Development in Indonesia

Date

December 16, 2020

Institutions

World Bank Group - City Planning Labs (lead)
CAPSUS (Private Sector Partner)
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Sustainable Development Goals covered

SDG 9 - Industry, innovation & infrastructure
SDG 10 - Reduced inequalities
SDG 11 - Sustainable cities & communities
SDG 13 - Climate action

Country

Indonesia

Data types and technologies

Administrative data
Geospatial data
Official statistics
Open data
Qualitative data
Satellite imagery
Survey data
Community generated data (public consultation)
Geospatial Information Systems
Open data portal
Modeling and Simulation

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Acronyms

ATR - Agrarian Affairs and Spatial Planning
BIG - Geospatial Information Agency
BRT - Bus Rapid Transit
CPL - World Bank's City Planning Labs
DECDG - World Bank's Development Economics Data Group
E-BRT - Electric Bus Rapid Transit
GHG - Greenhouse Gases
GPSDD - Global Partnership for Sustainable Development Data
MoHA - Ministry of Home Affairs
RDTR - Detailed Spatial Plan
RT - Neighbourhood admin boundary
RTRW - General Spatial Plan
RW - Community admin boundary
TFSCB - World Bank's Trust Fund for Statistical Capacity Building
UH - Urban Hotspots
UP - Urban Performance
VKT - Vehicle Kilometers Travelled

Urban Planning Tools as Agents of Change: Collaborative Spatial Data for Sustainable Urban Development in Indonesia

Objective

To support evidence-based decision-making processes in Indonesian cities with the development of tools that streamline data generation, publication, dissemination and analysis.

Executive Summary

Indonesian cities confront significant challenges regarding urban sprawl, inadequate infrastructure, and poor service provision. The current practice poses three main challenges:

Challenge 1) Lack of tools for testing policy, planning options and debating potential spatial growth scenarios, especially to promote low-carbon compact development.
Challenge 2) Understanding the needs of service provision in rapidly-changing built environments requires elementary datasets which are usually either of poor granularity, incomplete, or unavailable.
Challenge 3) Master plans evaluated and approved at national level face a large and growing backlog.

As part of this project the World Bank City Planning Labs (CPL) and CAPSUS team developed significant improvements to a previous proof of concept: Urban Hotspots and Urban Performance tools, and developed a third tool CollabData.

Urban Hotspots (UH) identifies optimal locations for a specific activity within a city, displaying heat maps of access to urban services and infrastructure.

The Urban Performance (UP) tool assesses the city's present and future performance by creating multiple growth scenarios that include investment projects, public policies and land regulations.

The new tool, CollabData allows multiple stakeholders to collaborate by gathering community perspectives in an agile, simple and highly customizable platform. With the addition of the CollabData tool, the team closed a full cycle of data generation, publication, analysis and dissemination.

The tools were tested with data from six Indonesian cities: Balikpapan, Bandung, Banjarmasin, Denpasar, Semarang, and Solo. The team developed a series of case studies, which are based on real demands from national and local governments. Case studies include public consultations and social monitoring with CollabData; affordable housing location policies and identification of strategic locations for new urban services with UH; and scenario development with UP to evaluate spatial plans, public space and river management policies, and E-Mobility strategies.

Given the positive reception from end-users in the pilot cities, other local governments, national institutions, and other World Bank teams requested rigorous review of these tools to suit their needs for spatial plans preparation in cities across the country, which was successfully completed.

Risks

The most important risk we have identified is that the tools do not get properly maintained. This is important because if the analytical tools do not get updated when new data is published they will quickly become obsolete. To mitigate this risk we turned to local governments and inquired where they are hosting (or planning to host) their data. We found that open data portals are key for this matter. Our risk management strategy was to develop the analytical tools so that they can pool data directly from the open data portals. This strongly mitigates the maintenance challenge, because the final user will no longer need to update data in the tools when data is updated in their open data portal.

Outcomes

The central outcomes from this project include significant updates to UH and UP and the development of CollabData, the new tool. However, the most valuable outcome lays on how local and national governments have appropriated the tools and initiated next steps. This includes Semarang using CollabData for COVID-19 city-wide monitoring at neighbourhood level; the Indonesian Geospatial Information Agency requesting technical assistance to embed UH and UP in the Palapa Geoportal, which is the base platform that the Geospatial Information Agency (BIG) uses to gather spatial information from more than 40 Indonesian cities; the World Bank Indonesia – Affordable Housing team, requesting assistance to evaluate more than 97,000 Affordable Housing subsidies in 6 Metropolitan Areas in Indonesia; and the Ministry of Agrarian Affairs and Spatial Planning (ATR) requesting the tools for land use conflict identification.

Contributions

This project is contributing to the production of highly disaggregated data by geography, that can be later aggregated with ease at different levels. It is contributing too to the ease of production of analysis of SDGs indicators.

Gender

This project is contributing to produce data disaggregated by gender. CollabData includes functionalities specifically designed for such purpose.

Source code

The source code for the three tools can be found at: https://github.com/UPTechMX

Lessons learned

Engaging with local stakeholders and potential users of the tools right from the beginning of the project was key to ensure full appropriation.

Developing flexible tools that can be adapted to different user-requirements and goals is crucial in the developing world, where national and local priorities are constantly evolving.

On the technical side, we observed that identity validation is a much more complex process that what we had anticipated for CollabData. At the beginning of the project we assumed that email validation was the most obvious solution. However, we observed that despite access to smartphones and mobile data, access to email is limited in Indonesia. We turned to SMS validation, but costs would have absorbed nearly the half of the total cost of the project. We finally turned to a combination of challenge–response test, statistical validation and top-down reference system.

Finally, another lesson learned from the technical side was the national and local government officials were frequently skeptical to cloud-based solutions. Our first reaction was to suggest installations in their own servers. The solution worked in most cases, but in others we enrolled in a vicious circle. To cite some examples: 1) A city's server was destroyed by a tsunami, and government regulations state that cloud-base solutions are forbidden for government applications for safety reasons. 2) The city could not grant the consultant team access to their server for security reasons. However, their staff lacks capacity to perform the installations and, in addition, they do not trust cloud-based solutions. Of course, eventually we overcome these challenges; but the process was much slower than what we had anticipated. With time, cloud-based solutions will probably become more popular. But at this point in time, our lesson learned is that we need to add a third option in addition to cloud and own-server options. This is: providing the hardware, either temporarily or permanently. We believe that this can be possible with recent low-cost barebone server solutions. The Raspberry Pi* 4 is a good example of barebone solutions which can be configured as server solutions.

Conclusions

At a strategic level, the three tools induce constructive disruptions in the traditional jurisdiction-bound planning and implementation process, shifting toward a more strategic disaggregated process. At the same time the tools speed-up the process of data collection and analysis. With this, governments can make better and informed decisions in shorter time frames, which is key in the rapidly-changing developing world. Importantly, the tools, especially the UP tool, are being used to inform low-carbon urban development with important linkages with climate change mitigation efforts.

Contributing Team:

World Bank

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CAPSUS

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The Raspberry Pi is a small and low-cost minimalist computer, which can be easily adapted to different functions. Version 4 maintains all functionalities described above but is much more powerful than previous versions. It is powerful enough to be used as a server for spatial data.

Acknowledgements

This project, **Urban Planning Tools as Agents of Change: Collaborative Spatial Data for Sustainable Urban Development in Indonesia**, submitted in response to the 2018 call for proposals by the World Bank's Development Economics Data Group (DECDG) and the Global Partnership for Sustainable Development Data (GPSDD), is supported by the World Bank's Trust Fund for Statistical Capacity Building III (TFSCB) with financing from the United Kingdom's Foreign, Commonwealth & Development Office, the Department of Foreign Affairs and Trade of Ireland, and the Governments of Canada and Korea.

The team is grateful to Government of Indonesia, for their collaboration, with a special thanks to the local governments who collaborated closely to share the data to test the tools under this pilot.

An earlier proof of concept for UH and UP tools received financial support from the Swiss State Secretariat for Economic Affairs (SECO) through the Indonesia Sustainable Urbanization Multi-donor Trust Fund (IDSUN MDTF).

BACKGROUND

Indonesian cities confront significant challenges regarding urban sprawl, inadequate infrastructure, and poor service provision. City governments need effective planning tools for coping with present and future challenges. Indonesia has established detailed urban spatial planning standards, designed to encompass an all-inclusive and participatory planning cycle. However, the current practice poses three main challenges:

Challenge 1) Lack of tools for testing policy, planning options and debating potential spatial growth scenarios. The current practice is based on spreading investments so as to balance the portion of the budget spent in each sub-district. To shift to an approach that accounts for spatially uneven investment needs, cities must assess the development impact of different options. Planning agencies need inputs from public stakeholders, the private sector, experts, and inhabitants.

Challenge 2) Understanding the needs of service provision in rapidly-changing built environments requires elementary datasets which are usually either of poor granularity, incomplete, or unavailable. This delays efficient assessment and impedes a nuanced cross-sectoral analysis. Current consultations rely on ad-hoc workshops, often resulting in limited representation and little pertinent debate. Additionally, current methods for processing and digitizing inputs received from consultations are slow, leaving little time for analysis.

Challenge 3) Master plans evaluated and approved at national level face a large and growing backlog. Evaluation of city-level master plans is done individually by ATR staff at national level. This time-intensive process is encumbered by the poor quality of data and inconsistent reporting formats at local level. Staff constraints at ATR mean that without more powerful tools to accelerate the process, this backlog -- currently about a thousand unreviewed spatial plans -- will continue to grow and impede progress in other parts of the planning and development process.

Why collaborative spatial data?

In the period 2016-2018, the World Bank CPL team and CAPSUS developed and tested two mutually synergetic urban planning tools –the **Urban Hotspots** (**UH**) tool and **Urban Performance** (**UP**) tool.

UH is a powerful web application that identifies optimal locations for a specific activity within a city, displaying heat maps of access to urban services and infrastructure. Urban Hotspots supports national urban planning agencies and city governments to perform land suitability assessment to plan for infrastructure deficits at the city and local levels, enabling inter-departmental coordination and a strategic planning approach.

The **UP** tool assesses the city's present and future performance by creating multiple growth scenarios that include investment projects, public policies and land regulations. The results are evaluated in a set of indicators related to the Sustainable Development Goals.

The tools were piloted in two Indonesian cities: Semarang and Denpasar. This exercise served as common decision support system for collaborative decision making across government entities for spatial urban planning.

The **UH** tool helped representatives of multiple city departments in Semarang to evaluate recently built affordable housing using indicators that contribute positively to the SDGs, that had not been previously considered in the affordable housing development planning, such as proximity to urban facilities.

Denpasar used the **UP** tool to assess the economic and environmental outcomes of developing eco-villages. This assessment helped officials to compare the impact of an environmentally favorable development versus a business-as-usual scenario, which would have seen these areas developed into urban areas.

The the World Bank CPL team and CAPSUS followed with a series of training sessions to ensure knowledge transfer to local stakeholders.

Given the positive reception from end-users in the pilot cities, other local governments, national institutions, and other World Bank teams inquired about a second iterations of these tools to suit their needs for spatial plan preparation in cities across the country.

OBJECTIVE

After the first pilot, in both Semarang and Denpasar, the team observed two key lessons learned.

First, stakeholders highlighted the importance of a user-friendly interface for uploading data and preparing the tools for analysis of the local context. In simple terms, the cities explained that they struggled enough with cleaning and uploading data to their open-data portals. And that importing such data to another tool left them with limited time for analysis.

Second, stakeholders recognized that the tools were very efficient for a top-down decision-making process. But that an open opportunity remained for bottom-up processes (community-led planning).

In the period 2019-2020, with the support of the **Data Innovation Fund**, the World Bank CPL team and CAPSUS further developed and extended the tools with the following **objective**:

> "To support evidence-based decision-making processes in Indonesia with the development of tools that streamline data generation, publication, dissemination and analysis"

The proof of concept described in previous sections was expanded to six cities. The team developed significant improvements to **UH** and **UP** to streamline the process of analysis. With the addition of **CollabData** tool, the team closed a full cycle of data generation, publication, analysis and dissemination.

The new tool, **CollabData** allows multiple stakeholders to collaborate in gathering ground perspectives from the community in an agile and highly customizable platform. CollabData is a robust digital platform that captures needs, challenges and ground realities of the communities, strengthens public consultations and simplifies the analysis of collected data with powerful visualizations.

METHODOLOGY

We followed an iterative-design methodology for this project. These methods are based on a cyclic processes of prototyping, testing and discussing with stakeholders, analyzing the results, and refining. We found great advantages from applying an iterative process. The most important is that stakeholders were able to test and provide comments about the platforms from a very early stage of the project. This allowed us enough time to adapt and to redefine our work to ensure that it was aligned with interests, capacities and real needs.

As described before, our work focused on the improving **UH** and **UP** and in the development of a third tool, **CollabData**.

Step 1: Data gathering

First, we gathered elementary datasets for the six pilot cities, including: Tabular and geospatial data form official and open data sources and data derived by us with remote sensing techniques. Collected data included administrative boundaries, economic activity, population, transit, exposure to hazards, zoning and access to urban services.

Step 2: Tool development

For each tool we developed two Beta versions before arriving to a final version of the tool. All versions were tested with local and national government officials, local consultants, academic groups and with other World Bank teams.

Step 3: Testing

For each tool-version, we ran cyclic processes that included agile prototyping, testing and discussing with all stakeholders, analyzing the results and summarizing key inputs, and refining the tools. It is important to note that in each cycle we turned to our technical staff to ensure that changes made will be easy to install, maintain and update. It is important to note that a full cycle iterated from Step 1 to Step 3. It is important to note as well that final versions were used to solve real concerns from the cities.

Step 4: Documentation

Finally, once that we had arrived to a final version of the tools, we turned to documentation and developed material for dissemination and training.

OUTCOMES

The central outcomes from this project include significant updates to **UH** and **UP** and the development of **CollabData**, the new tool. However, the most valuable outcome lays on how local and national governments have appropriated the tools and how they envision next steps. The following paragraphs describe the appropriation process.

As described before, with **CollabData** users can collect data and transform it into useful information right in the same platform. Similarly to many other cities in the developing world, the City of Semarang faced important challenges for data generation along the COVID-19 pandemic. The city turned to **CollabData** and used the tool too for:

- Fast remote data collection
- Massive data management
- Just in time analytics

On May 27th, 2020 the city started their first cycle. The city requested inputs from different administrative levels: District (Kecamatan), Village (Kelurahan), community (RW), and neighbourhood (RT).

On June 7th, the city closed the first loop with 7,800 registered users, which provided:
100% of all requested Kecamatan data
100% of all requested Kelurahan data
73% of all requested data at RW level
40% of all requested data at RT level

With these outcomes, the city mapped COVID-19 mid and severe symptoms, and death cases, unemployment, food security, migration, vulnerable groups, household quarantine ability, socialization and preventive measures taken at local level, access to sanitation and social assistance.

Semarang City officials used the tool to gather key information from more than **63,200 households** in less than **11 days**, even under a pandemic lockdown.

In September 2020, the **Ministry of Home Affairs** (MoHA) started a process to integrate CollabData in their data collection process. MoHA plans to pilot **10 cities** for producing **economic-recovery data** after the COVID-19 pandemic.

In October 2020, Semarang started preparations for a second application of CollabData, this time to identify **school improvement** needs.

Why collaborative spatial data?

In regards to **UH** and **UP**, both are now embedded directly on the cities' open data portals. City officials can use their own data with no need to download and import it to a different tool. This change drastically simplifies the planning process by shortening the time to organize and clean data. Users can now use that time to analyze information, produce scenarios and make evidence-based decisions.

Along the implementation of this project we developed **6 UH case studies** to identify strategic locations for **affordable housing** in Balikpapan, Bandung, Bajarmasin, Denpasar, Semarang and Solo.

In addition, following a specific request from BAPPENAS, Semarang we developed another case study to **identify strategic locations for the development of a new hospital**.

In regards to **UP**, we developed a series of case studies –again, all of them based on specific demands from stakeholders. First, we used **UP** for to evaluate **Denpasar's spatial-plan**. Then, we turned to Banjarmasin to model **public spaces and river management policies**. Finally, we contrasted **E-Mobility policies in Bandung, Balikpapan, Semarang and Solo.**

Why collaborative spatial data?

In June 2020, the Indonesian **Geospatial Information Agency** (BIG) requested technical assistance to embed **UH** and **UP** in the Palapa Geoportal, which is the base platform BIG uses to gather spatial information from more than **40 Indonesian cities**.

In August 2020, the World Bank Indonesia – Affordable Housing team, requested assistance from the CPL and CAPSUS team to replicate the "6 Case Studies for Affordable Housing", and evaluate more than **97,000 Affordable Housing subsidies in 6 Metropolitan Areas in Indonesia**. This assessment will provide key information to the **Ministry of Public Works** about improvements on Indonesia's housing policy.

Finally, in September 2020, the Indonesian **Ministry of Agrarian Affairs and Spatial Planning** (ATR) requested technical assistance from CPL to use the three tools, CollabData, UH and UP for the development of a "land use conflict identification strategy". With this process, ATR will pilot a new methodology in Lombok Tengah. ATR's main goal is to explore future land use patterns through a sequence of conducting a suitability analysis, identifying land use preferences, and mapping potential land use conflicts.

Overall, **UH** and **UP** are now embedded directly in 2 cities' open data portals: Balikpapan and Denpasar. City officials can use their own data with no need to download and import it to a different tool. This change drastically simplifies the planning process by shortening the time to organize and clean data. Users can now use that time to analyze information, produce scenarios and make evidence-based decisions.

The work developed with local stakeholders provides a platform for those city governments that want to advance in reaching the Sustainable Development Goals, but have limited resources or capacity for evidence-based planning.

This project is disrupting the status quo of slow and rigid planning processes by streamlining the production of disaggregated data and by contributing to dissemination and co-creation.

The work described in this document was performed side-to-side with local governments. This facilitated the internalization of the tools by end-users through hands-on usage and training rather than mere dissemination.

Why collaborative spatial data?

The tools facilitate prioritization among multiple competing concerns when identifying potential conflicts. They simplify too the identification of potential trade-offs, i.e. benefits and drawbacks from the application of a public policy.

At a strategic level, the three tools induce constructive disruptions in the traditional jurisdiction-bound planning and implementation process, shifting toward a more strategic disaggregated process. At the same time the tools speed-up the process of data collection and analysis. With this, governments can make better and informed decisions in shorter time frames, which is key in the rapidly-changing developing world.

Organization of this report

This report is divided in four main sections. The first three sections describe the tools and present a series of case studies for each tool.

Section 1. Urban Hotspots
Section 2. Urban Performance
Section 3. CollabData

Additional resources
This report includes series of attachments which can be useful for further use and appropriation of the tools.

The brochures are brief documents that describe in a 5-minutes read what are the tools and how they can be useful for evidence-based decision-making.

Annex 1: UH brochure
Annex 2: UP brochure
Annex 3: CollabData brochure

The user manuals include basic instructions to use the tools in step-by-step and user-friendly descriptions.

Annex 4: UH manual
Annex 5: UP manual
Annex 6: CollabData manual

The technical reports include all documentation regarding methods for each tool, as well as detailed instructions for system administrators.

Annex 7: UH technical report
Annex 8: UP technical report
Annex 9: CollabData technical report

Finally, the source code for the three tools, the manuals, technical reports, case studies and brochures, can be found at the following public repositories:

Geoportal UH and UP
https://uptechmx.github.io/UPT-Site/

CollabData
https://github.com/UPTechMX/collabmap/blob/CollabData/README.md

URBAN HOTSPOTS

Case Studies 2020

URBAN HOTSPOTS

CPL City Planning Labs

Urban Hotspots is a powerful web application that identifies optimal locations for a specific activity within a city, displaying heat maps of access to urban services and infrastructure. Urban Hotspots supports national urban planning agencies and city governments to perform land suitability assessment to plan for infrastructure deficits at the city and local levels, enabling inter-departmental coordination and a strategic planning approach.

Urban Hotspots performs in the following features:

Land suitability: Find strategic locations for schools, hospitals, parks or other urban services. The tool also identifies areas with lack of infrastructure and urban services.

Social housing projects: Identify the optimal location for social housing projects with transparent methods.

Create consensus: Use the tool in a workshop and use interactive maps to create consensus.

"Multiplatform web app that performs agile assessments, can be accessed from any operative system and is open source so all the methods in the tool are scalable, transparent, replicable and customizable"

We acknowledge the invaluable support of the World Bank's Trust Fund for Statistical Capacity Building (TFSCB) in the making this project.
The latest version of Urban Hotspots was developed at City Planning Labs and is maintained by CAPSUS, UPTech and a community of developers.
Urban Hotspots is an open source Oskari bundle and extension and its source code can be found at GitHub: https://github.com/UPTechMX.

Urban Hotspots identifies optimal locations for a specific activity within a city, displaying heat maps of access to urban services and infrastructure.

In this document, we present a series of case studies, where we analyzed spatial data with Urban Hotspots.

In the first set of case studies, we identify the most suitable locations for the development of affordable housing projects in Balikpapan, Bandung, Banjarmasin, Denpasar, Semarang and Solo, Indonesia.

In the second case study, is based on a direct request that the CPL team received from BAPPEDA Semarang, to identify the most suitable locations for the construction of a new hospital in Semarang.

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Case study 2: Bandung

Case study 3: Banjarmasin

Case study 4: Denpasar

Case study 5: Semarang

Case study 6: Solo

Location of new hospital

Case study 7: Semarang

Affordable housing in Balikpapan

CASE STUDY

Affordable housing offers housing units that are affordable by the section of society whose income is below the median household income. **Affordable housing supports human well-being** by promoting reasonable and fair costs of land, access to basic urban services, public space, and opportunities for economic and social development. In this case study, we will identify the most suitable locations for affordable housing in Balikpapan city.

The first step is to identify **the job hubs in Balikpapan.** For this, we evaluate the jobs layer in the tool. In Figure 1 we can see, in blue to orange tones, the concentration of jobs, where the possible affordable housing areas should be located.

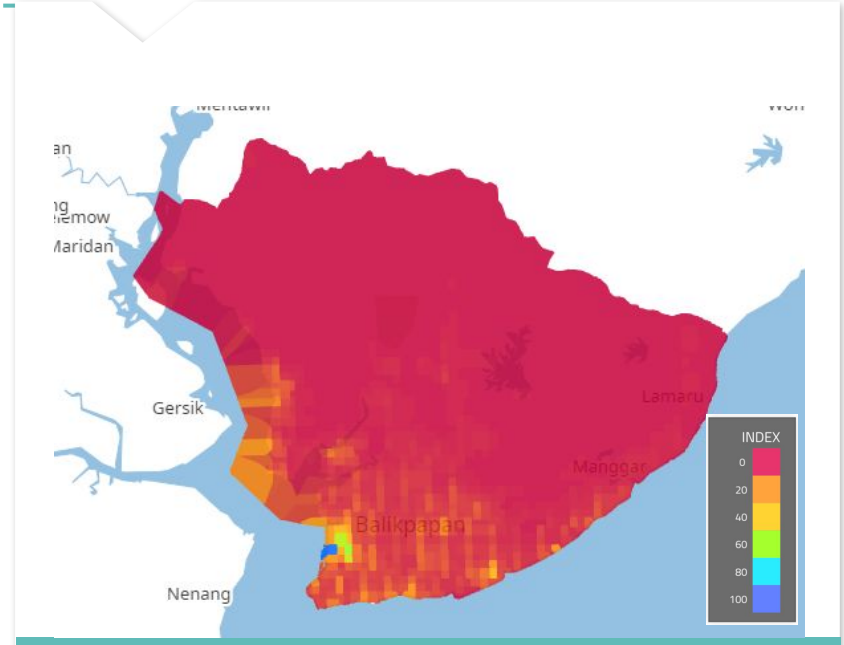

Figure 1. Employment index in Balikpapan city.

Then, we identified coverage areas for urban services. The analysis included **urban amenities coverage** (school facilities, public spaces and health facilities) and **transport proximity**. Light blue and green colors depict urban zones covered by services, as indicated in Figure 2.

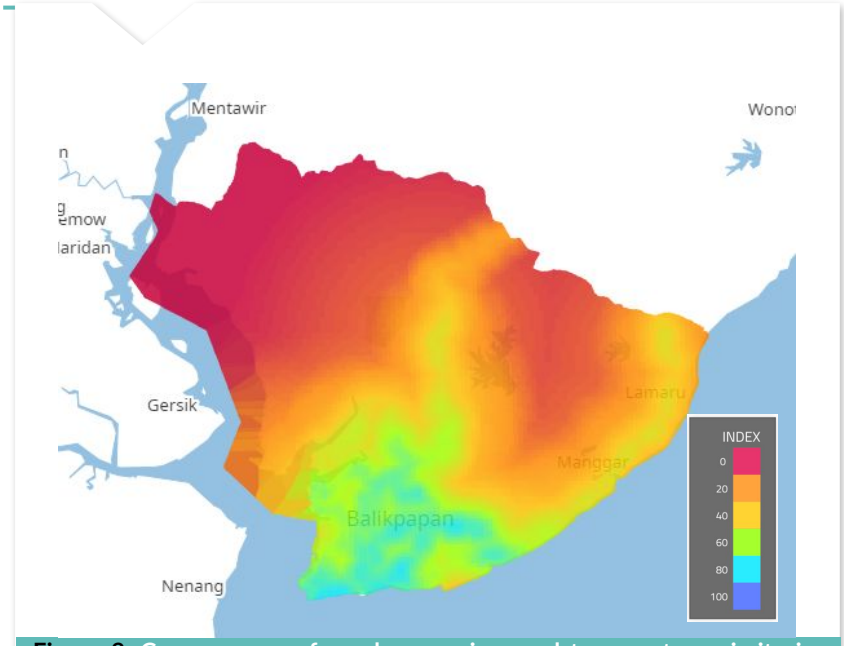

Figure 2. Coverage area for urban services and transport proximity in Balikpapan city.

Then, we added the jobs hub layer to the analysis. We filtered in a range of 50 - 100 to **remove the lowest values,** where the coverage of urban services, and jobs do not meet the criteria, see Figure 3.

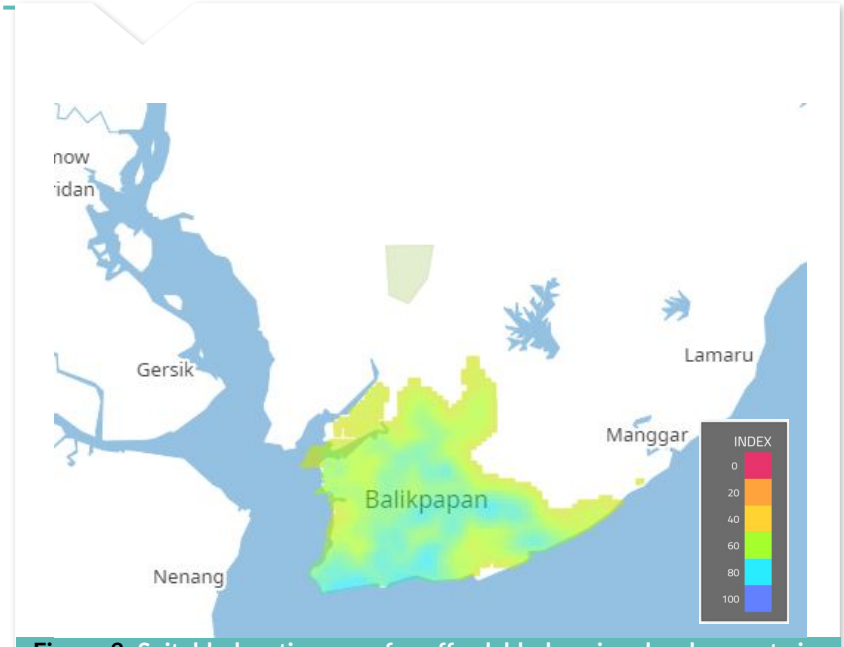

Figure 3. Suitable location map for affordable housing developments in Balikpapan city.

Additionally, the resulting scores are filtered by **risk free zones**, removing hazard prone areas to foster safe urban settlements. Figure 4 perform **the most suitable places for affordable housing zones through a complete analysis** which promotes compact growth and well-being for people in cities.

Figure 4. The most suitable locations for affordable housing developments in Balikpapan city.

Affordable housing in Bandung

CASE STUDY

Affordable housing offers housing units that are affordable by the section of society whose income is below the median household income. **Affordable housing supports human well-being** by promoting reasonable and fair costs of land, access to basic urban services, public space, and opportunities for economic and social development. In this case study, we will identify the most suitable locations for affordable housing in Bandung city.

The first step is to identify **the job hubs in Bandung.** For this, we evaluate the jobs layer in the tool. In Figure 5 we can see, in blue to orange tones, the concentration of jobs, where the possible affordable housing areas should be located.

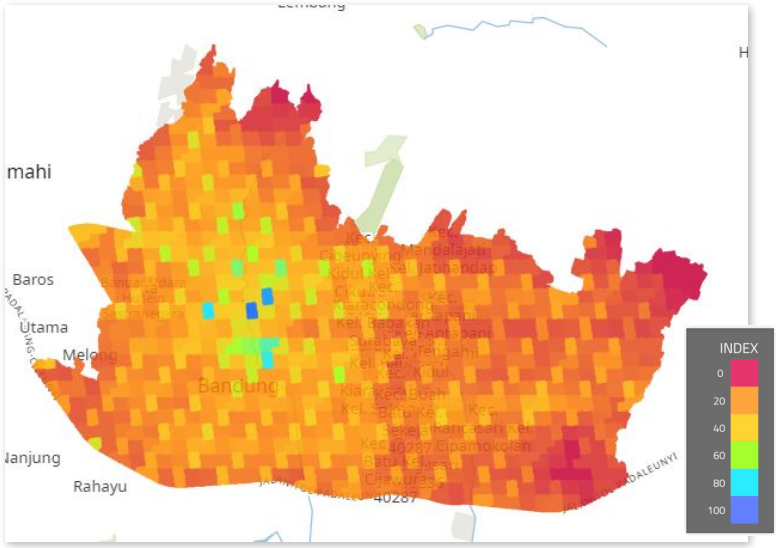

Figure 5. Employment index in Bandung city.

Then, we identified coverage areas for urban services. The analysis included **urban amenities coverage** (school facilities, public spaces and health facilities) and **transport proximity.** Light blue and green colors depict urban zones covered by services, as indicated in Figure 6.

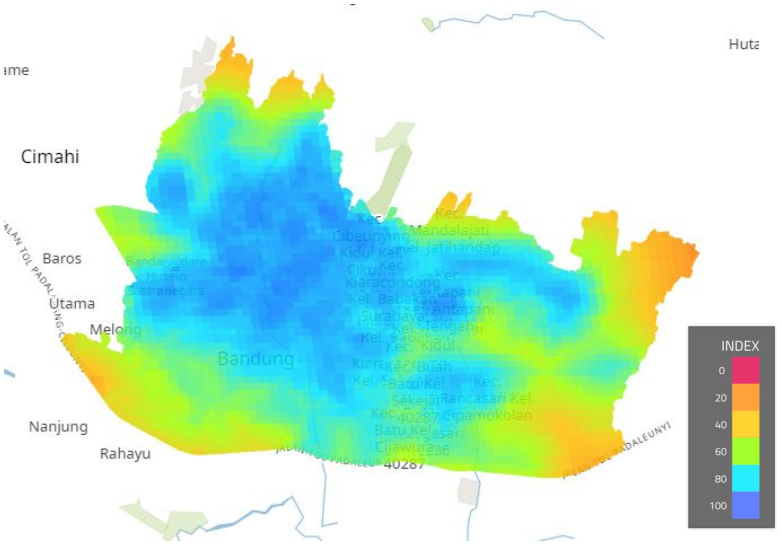

Figure 6. Coverage area for urban services and transport proximity in Bandung city.

Then, we added the jobs hub layer to the analysis. We filtered in a range of 50 - 100 to **remove the lowest values,** where the coverage of urban services, and jobs do not meet the criteria, see Figure 7.

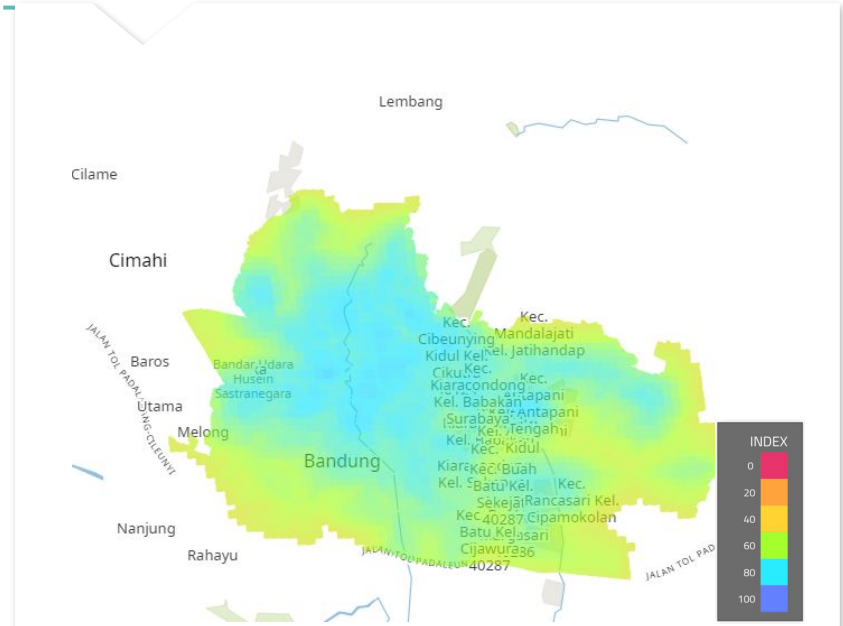

Figure 7. Suitable location map for affordable housing developments in Bandung city.

Additionally, the resulting scores are filtered by **risk free zones**, removing hazard prone areas to foster safe urban settlements. Figure 8 perform **the most suitable places for affordable housing zones through a complete analysis** which promotes compact growth and well-being for people in cities.

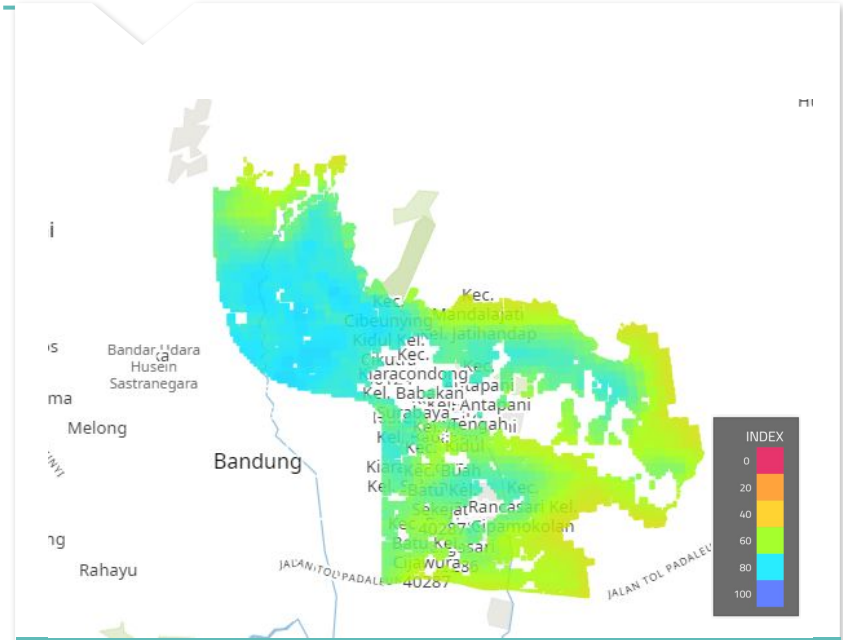

Figure 8. The most suitable locations for affordable housing developments in Bandung city.

Affordable housing in Banjarmasin

CASE STUDY

Affordable housing offers housing units that are affordable by the section of society whose income is below the median household income. **Affordable housing supports human well-being** by promoting reasonable and fair costs of land, access to basic urban services, public space, and opportunities for economic and social development. In this case study, we will identify the most suitable locations for affordable housing in Banjarmasin city.

The first step is to identify **the job hubs in Banjarmasin.** For this, we evaluate the jobs layer in the tool. In Figure 9 we can see, in blue to orange tones, the concentration of jobs, where the possible affordable housing areas should be located.

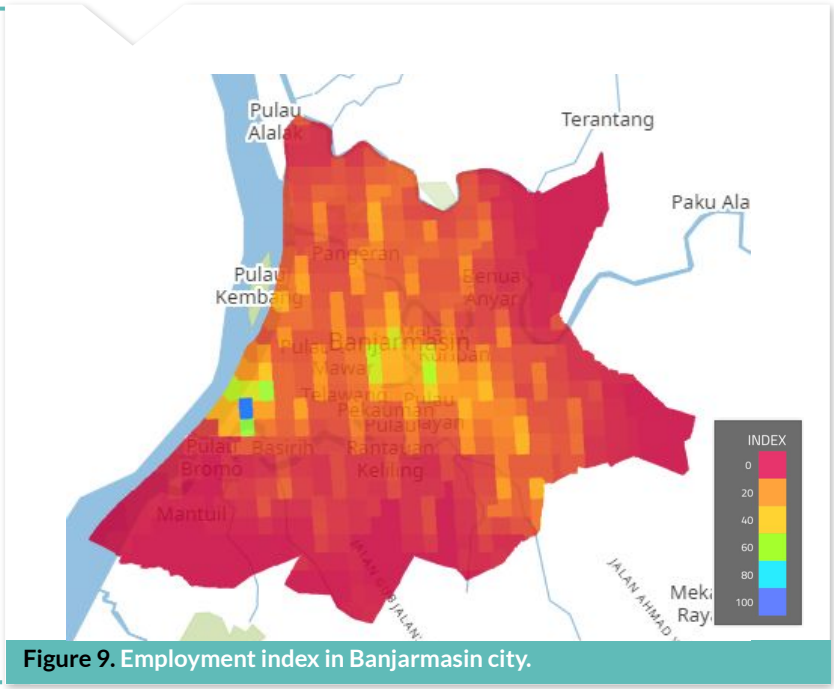

Figure 9. Employment index in Banjarmasin city.

Then, we identified coverage areas for urban services. The analysis included **urban amenities coverage** (school facilities, public spaces and health facilities). Light blue and green colors depict urban zones covered by services, as indicated in Figure 10.

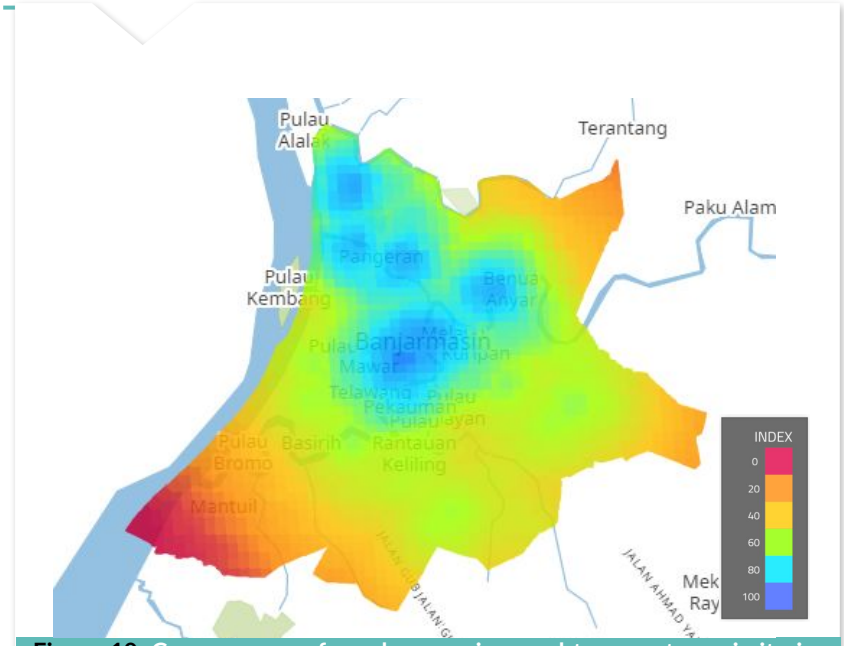

Figure 10. Coverage area for urban services and transport proximity in Banjarmasin city.

Then, we added the jobs hub layer to the analysis. We filtered in a range of 50 - 100 to **remove the lowest values,** where the coverage of urban services, and jobs do not meet the criteria, see Figure 11.

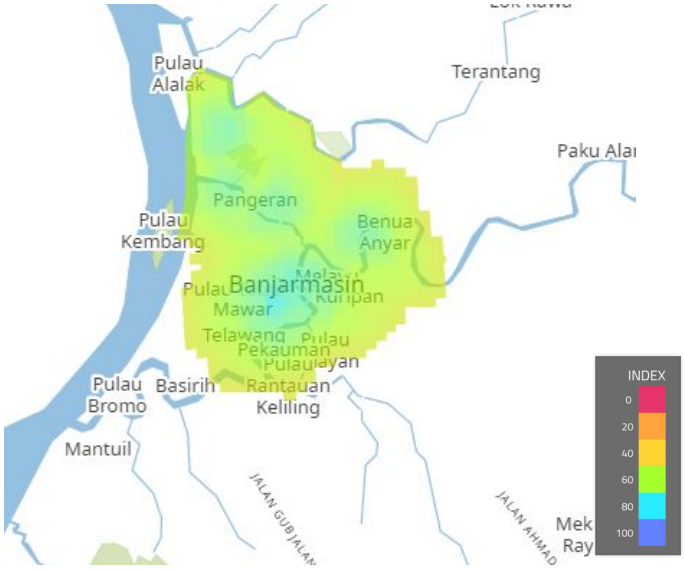

Figure 11. Suitable location map for affordable housing developments in Banjarmasin city.

Additionally, the resulting scores are filtered by **risk free zones**, removing hazard prone areas to foster safe urban settlements. Figure 12 perform **the most suitable places for affordable housing zones through a complete analysis** which promotes compact growth and well-being for people in cities.

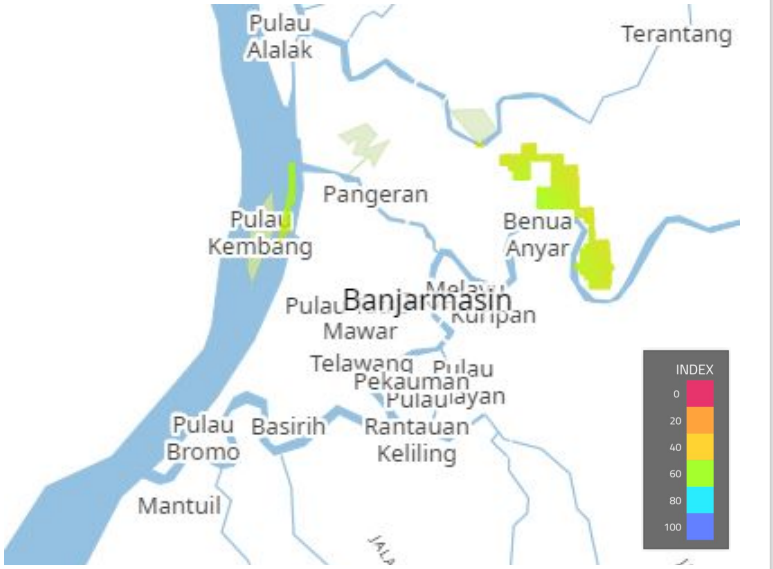

Figure 12. The most suitable locations for affordable housing developments in Banjarmasin city.

Affordable housing in Denpasar

CASE STUDY

Affordable housing offers housing units that are affordable by the section of society whose income is below the median household income. **Affordable housing supports human well-being** by promoting reasonable and fair costs of land, access to basic urban services, public space, and opportunities for economic and social development. In this case study, we will identify the most suitable locations for affordable housing in Denpasar city.

The first step is to identify **the job hubs in Denpasar.** For this, we evaluate the jobs layer in the tool. In Figure 13 we can see, in blue to orange tones, the concentration of jobs, where the possible affordable housing areas should be located.

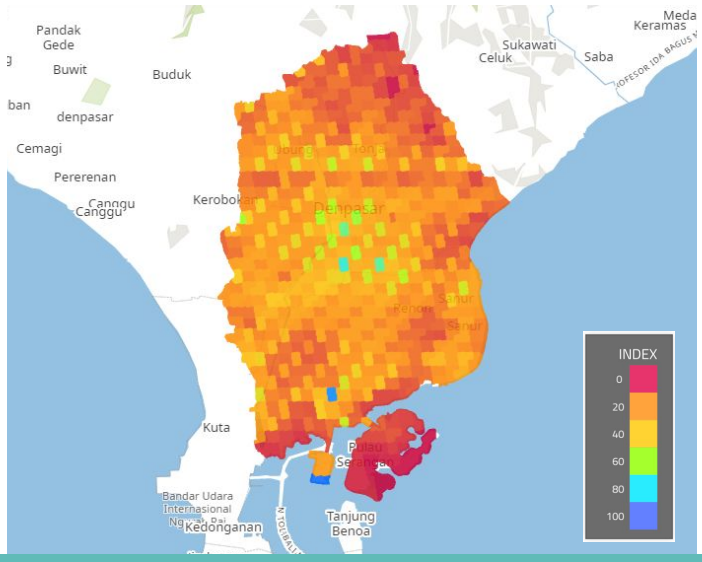

Figure 13. Employment index in Denpasar city.

Then, we identified coverage areas for urban services. The analysis included **urban amenities coverage** (school facilities, public spaces and health facilities) and **transport proximity.** Light blue and green colors depict urban zones covered by services, as indicated in Figure 14.

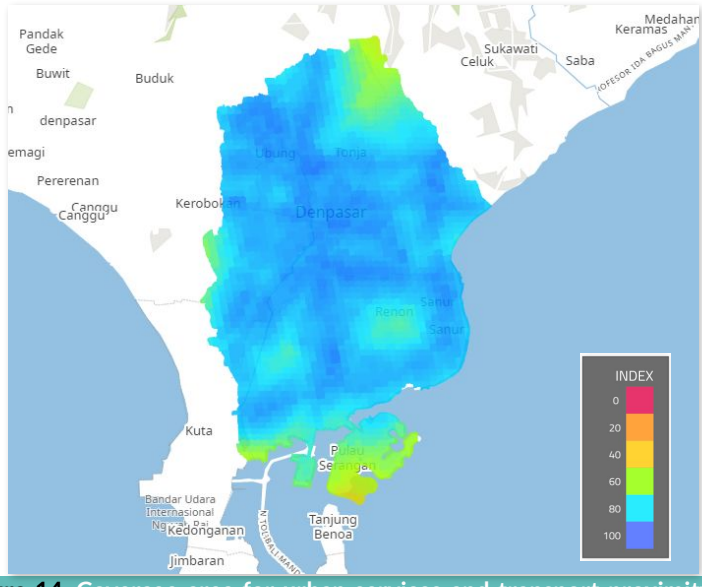

Figure 14. Coverage area for urban services and transport proximity in Denpasar city.

Then, we added the jobs hub layer to the analysis. We filtered in a range of 70 - 100 to **remove the lowest values,** where the coverage of urban services, and jobs do not meet the criteria, see Figure 15.

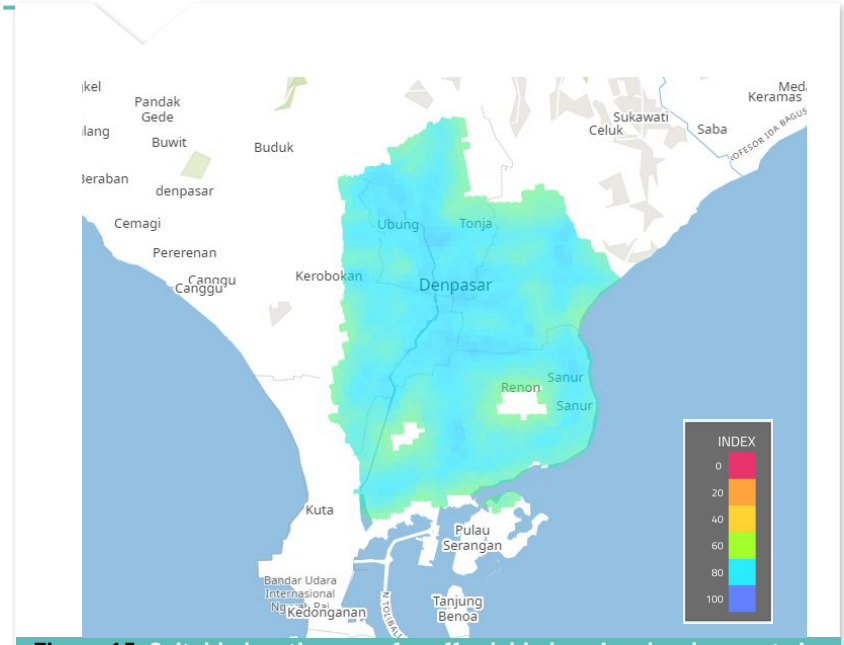

Figure 15. Suitable location map for affordable housing developments in Denpasar city.

Additionally, the resulting scores are filtered by **risk free zones**, removing hazard prone areas to foster safe urban settlements. Figure 16 perform **the most suitable places for affordable housing zones through a complete analysis** which promotes compact growth and well-being for people in cities.

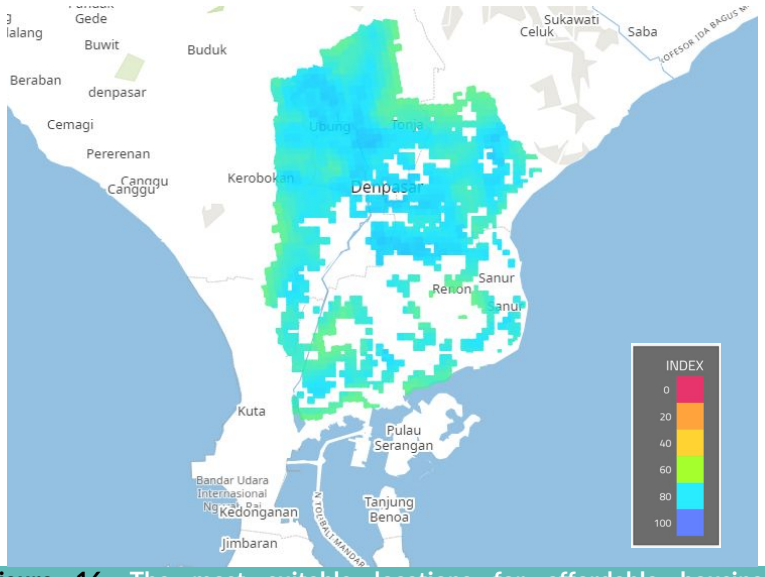

Figure 16. The most suitable locations for affordable housing developments in Denpasar city.

Affordable housing in Semarang

CASE STUDY

Affordable housing offers housing units that are affordable by the section of society whose income is below the median household income. **Affordable housing supports human well-being** by promoting reasonable and fair costs of land, access to basic urban services, public space, and opportunities for economic and social development. In this case study, we will identify the most suitable locations for affordable housing in Semarang city.

The first step is to identify **the job hubs in Semarang.** For this, we evaluate the jobs layer in the tool. In Figure 17 we can see, in blue to orange tones, the concentration of jobs, where the possible affordable housing areas should be located.

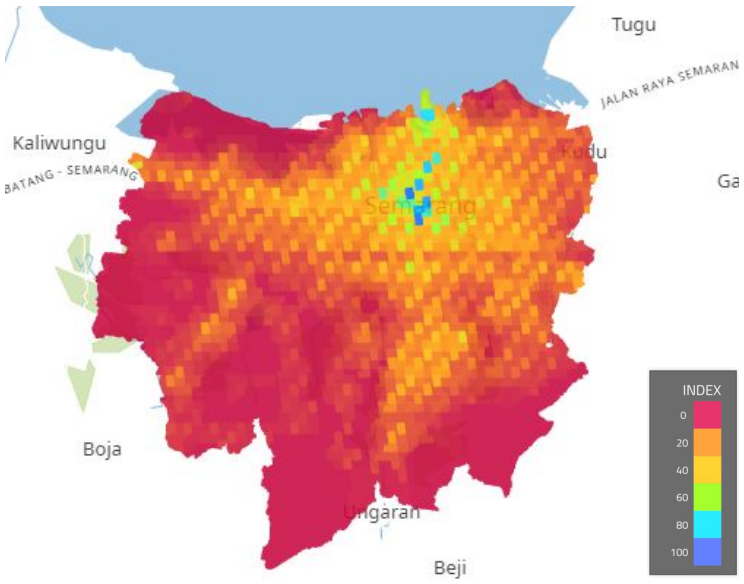

Figure 17. Employment index in Semarang city.

Then, we identified coverage areas for urban services. The analysis included **urban amenities coverage** (school facilities, public spaces and health facilities) and **transport proximity**. Light blue and green colors depict urban zones covered by services, as indicated in Figure 18.

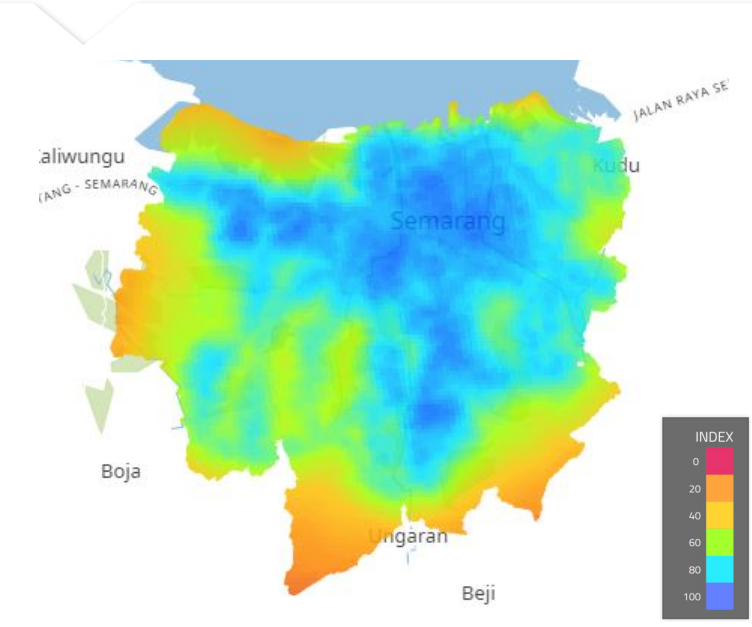

Figure 18. Coverage area for urban services and transport proximity in Semarang city.

Then, we added the jobs hub layer to the analysis. We filtered in a range of 50 - 100 to **remove the lowest values,** where the coverage of urban services, and jobs do not meet the criteria, see Figure 19.

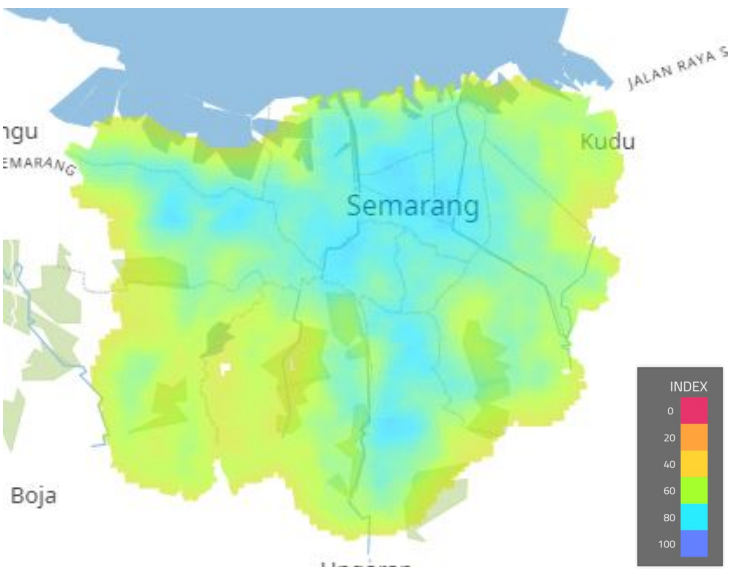

Figure 19. Suitable location map for affordable housing developments in Semarang city.

Additionally, the resulting scores are filtered by **risk free zones**, removing hazard prone areas to foster safe urban settlements. Figure 20 perform **the most suitable places for affordable housing zones through a complete analysis** which promotes compact growth and well-being for people in cities.

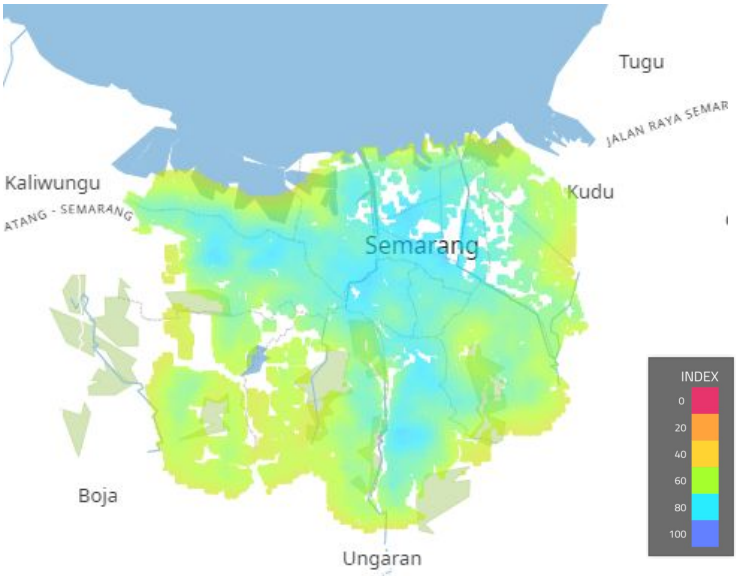

Figure 20. The most suitable locations for affordable housing developments in Semarang city.

Affordable housing in Solo

CASE STUDY

Affordable housing offers housing units that are affordable by the section of society whose income is below the median household income. **Affordable housing supports human well-being** by promoting reasonable and fair costs of land, access to basic urban services, public space, and opportunities for economic and social development. In this case study, we will identify the most suitable locations for affordable housing in Solo city.

The first step is to identify **the job hubs in Solo.** For this, we evaluate the jobs layer in the tool. In Figure 21 we can see, in blue to orange tones, the concentration of jobs, where the possible affordable housing areas should be located.

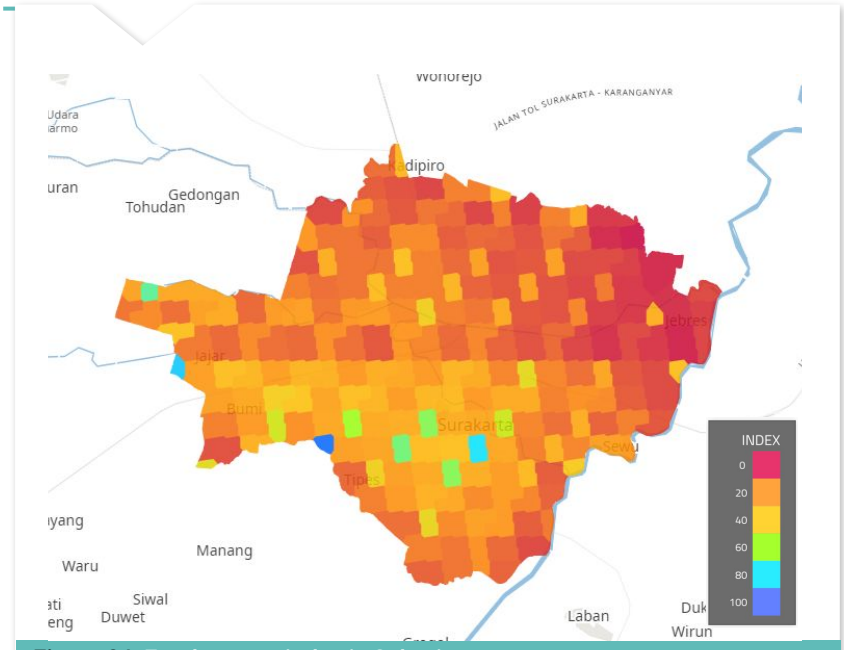

Figure 21. Employment index in Solo city.

Then, we identified coverage areas for urban services. The analysis included **urban amenities coverage** (school facilities, public spaces and health facilities) and **transport proximity**. Light blue and green colors depict urban zones covered by services, as indicated in Figure 22.

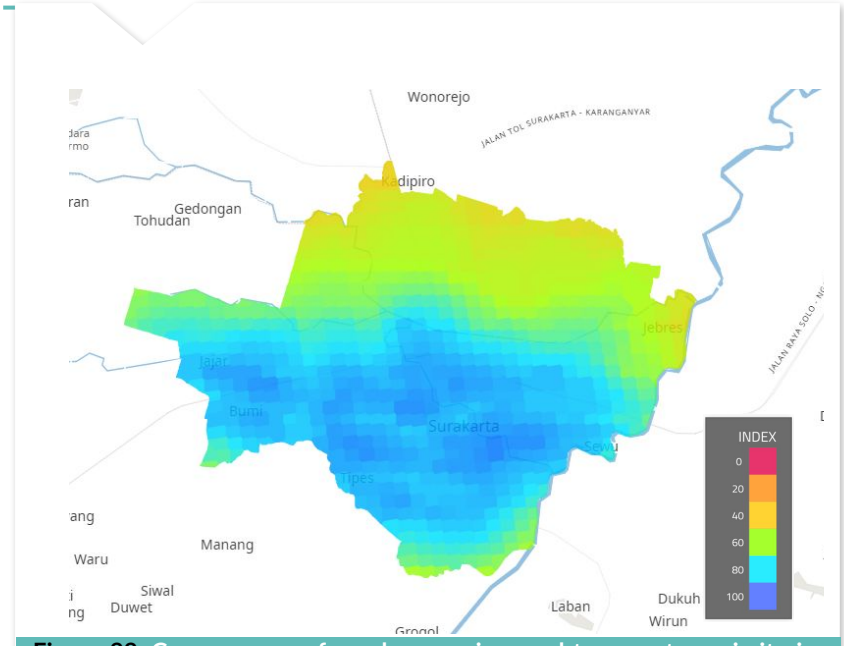

Figure 22. Coverage area for urban services and transport proximity in Solo city.

Then, we added the jobs hub layer to the analysis. We filtered in a range of 50 - 100 to **remove the lowest values,** where the coverage of urban services, and jobs do not meet the criteria, see Figure 23.

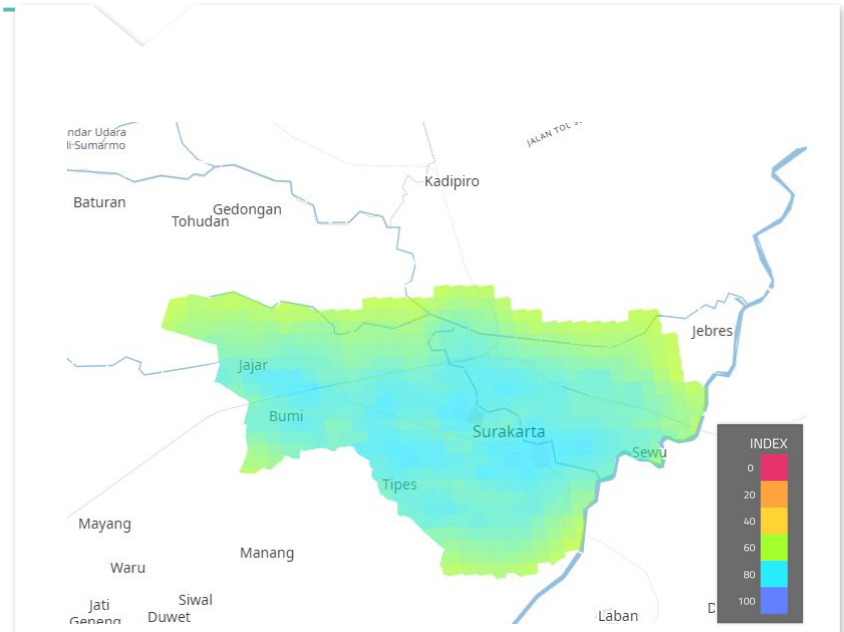

Figure 23. Suitable location map for affordable housing developments in Solo city.

Additionally, the resulting scores are filtered by **risk free zones**, removing hazard prone areas to foster safe urban settlements. Figure 24 perform **the most suitable places for affordable housing zones through a complete analysis** which promotes compact growth and well-being for people in cities.

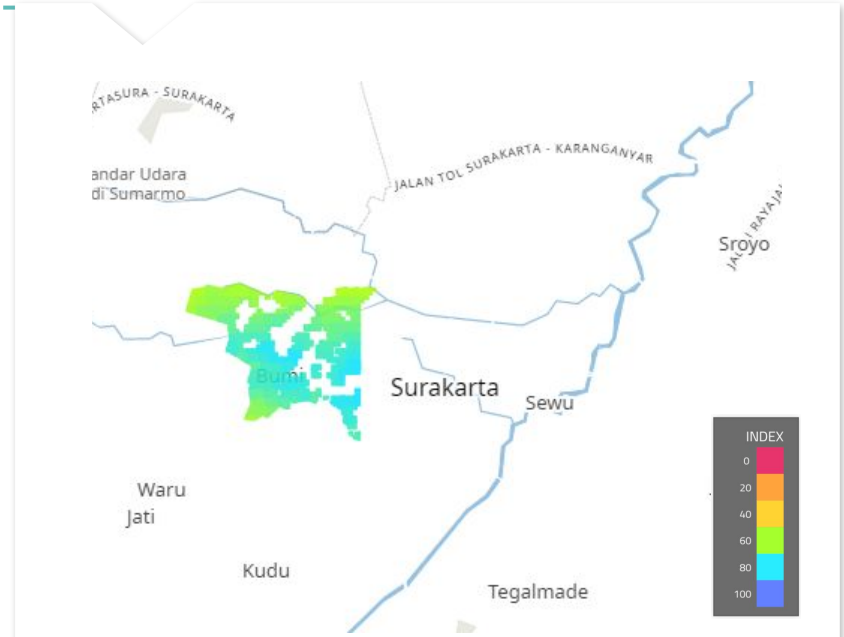

Figure 24. The most suitable locations for affordable housing developments in Solo city.

Location for a new hospital in Semarang

CASE STUDY

In this case study, we will identify the most suitable locations to **build a new hospital** in Semarang city. Two important factors will be considered, the hospital should be located in areas outside the current hospital coverage radius and the location should be as populated a possible.

Firstly, it is necessary to identify **areas outside the hospital coverage radius** established by the Indonesian coverage standard (3000 meters). In Figure 25, we can see, in blue and green, the areas outside the recommended coverage radius. In these areas should be located the new hospital, however, data about population is still needed.

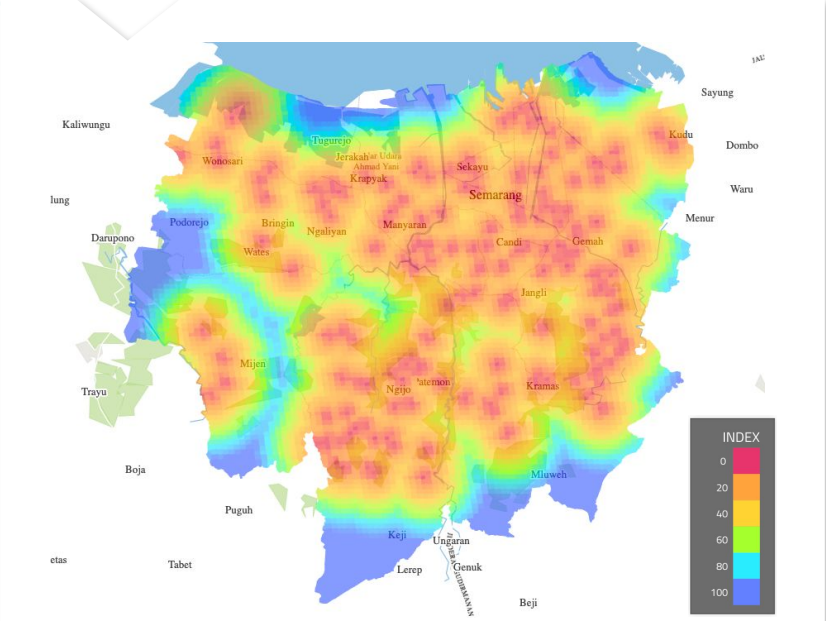

Figure 25. Radio coverage for hospitals in Semarang City.

Secondly, we need to identify **populated areas**, indicated in blue and green tones by Figure 26. Orange tones represent a moderated population density. The new hospital must be located in an uncovered area and it should be as populated a possible. Both conditions must be met. To achieve the above, the tool will apply a standardization process to set the information layers into one single index ranging from 1 to 100.

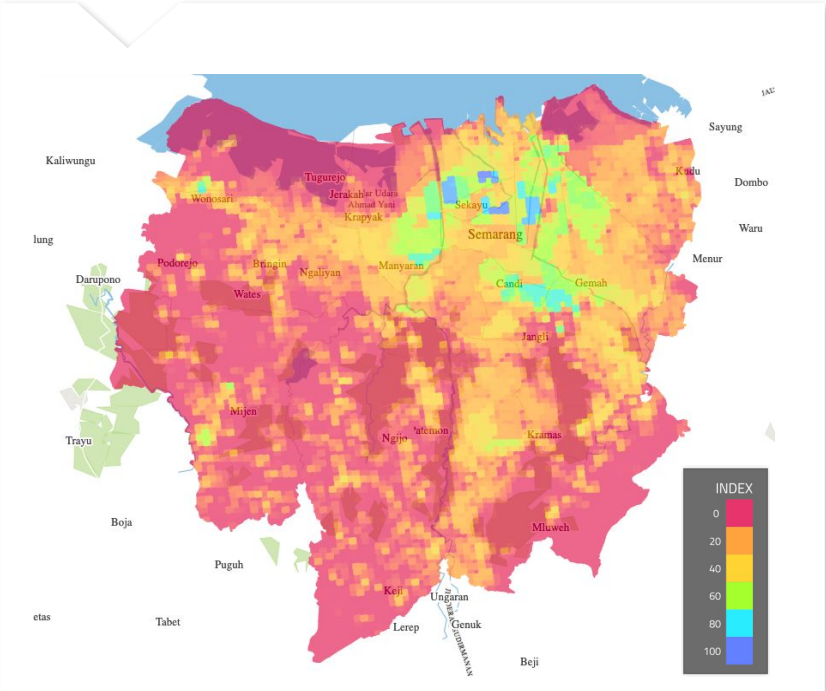

Figure 26. Population density in Semarang city.

After going through the normalization process, the layer of Figure 3 was obtained. This layer represents the **results of the standardization of two layers**, Figure 1 and Figure 2, expressed in one single index. Since the results are between 0 and 55 approximately, within the suitability index, we only visualize the results ranging between 20 and 35, Figure 27.

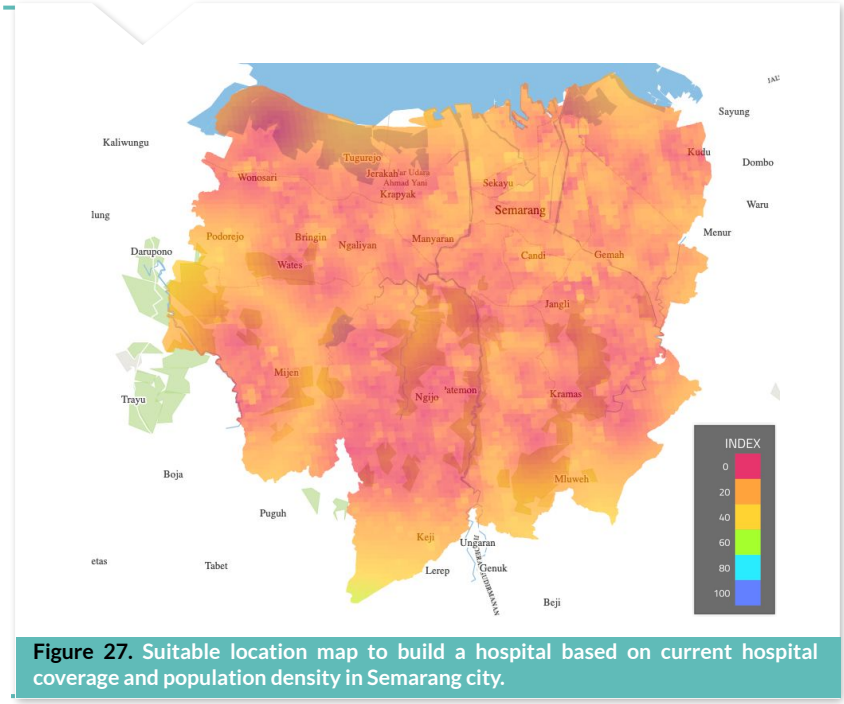

Figure 27. Suitable location map to build a hospital based on current hospital coverage and population density in Semarang city.

Finally, the areas indicated in orange tones are the most suitable for placing a new hospital according to the established criteria. It is important to note that the results are between 20 and 40 in the suitability index, which means that there are no highly populated areas that are also outside the radius of coverage for hospitals. In this case, the areas illustrated in Figure 28 represent **regions with an average population density that are outside the coverage area for hospitals.**

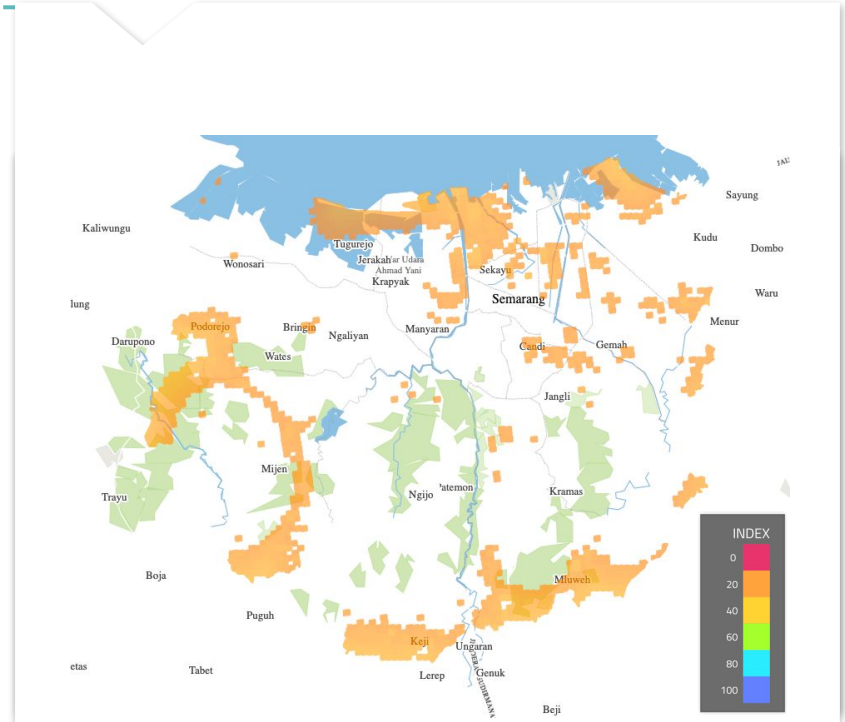

Figure 28. The most suitable locations to build a hospital based on current hospital coverage and population density in Semarang city.

URBAN
HOTSPOTS

Case Studies **2020**

We acknowledge the invaluable support of the World Bank's Trust Fund for Statistical Capacity Building (TFSCB) in the making this project.
The latest version of Urban Hotpots was developed at City Planning Labs and is maintained by CAPSUS, UPTech and a community of developers.
Urban Hotspots is open source and its source code can be found at GitHub: https://github.com/UPTechMX.


URBAN
PERFORMANCE
Case Studies 2020

UP URBAN PERFORMANCE

CPL City Planning Labs

The Urban Performance tool assesses the city's present and future performance of a city by creating multiple growth scenarios that include public policies (e.g., densification strategies for compact cities), investment projects (e.g. low carbon technologies in transport), and land regulations. The results are evaluated in a set of indicators related to the Sustainable Development Goals.

The Urban Performance tool allows:

Scenarios development: Urban Performance is a powerful web application that easily creates dozens of urban growth scenarios allowing decision-makers to evaluate policy actions and land regulations in seconds.

City plan evaluation: The tool supports the preparation and further evaluation of city plans in a massive way, assessing the validity and correct implementation of the regulations expressed in the plans.

Evidence-based decision - making: Urban Performance advances consensus between different actors and supports decision-making based on quantitative evidence.

"Generating multiple growth scenarios and spatial solutions for the evaluation of policy options in a continuous improvement cycle"

We acknowledge the invaluable support of the World Bank's Trust Fund for Statistical Capacity Building (TFSCB) in the making this project. The latest version of Urban Performance was developed at City Planning Labs and is maintained by CAPSUS, UPTech and a community of developers. Urban Hotspots is an open source Oskari bundle and extension and its source code can be found at GitHub: https://github.com/UPTechMX.

The **Urban Performance** tool assesses the city's present and future performance by creating multiple growth scenarios that include investment projects, public policies and land regulations.

This document presents a series of Urban Performance case studies. First, following a specific request from ATR, we used Urban Performance to evaluate Denpasar's Detailed Spatial Plan (RDTR). The assessment contrasts present conditions in the city with a "What-if" scenario, in which population density reaches the maximum values described in the RDTR. Second, we modeled the development of linear green public spaces in Banjarmasin. Finally, following a request from the WB Indonesia –.

Transport team, we modeled the potential effects of transforming present Bus lines into a BRT system in Bandung, Balikpapan, Banjarmasin, Semarang and Solo. Then, we turned to E-Mobility and modeled the potential effects of using electric buses for the BRT system. Finally, we developed an additional scenario with a cleaner energy mix.

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Case study 6: Solo

Detailed Spatial Plan evaluation in Denpasar

CASE STUDY

The Indonesian planning system adopts a hierarchical structure, in which spatial plans are made at the national, provincial and local governmental tiers. Each tier is required to prepare several plans with different scales, -general spatial plan (RTRW), **detailed spatial plan (RDTR)** and detailed engineering design (RTR)-. In this case study, we will compare two scenarios, the first one representing the distribution of the population according to the current RDTR, i.e. how would the city look like if the RDTR is implemented and reaches its full potential. The RDTR scenario is compared with a Base scenario, which describes present conditions. It is expected that more than 100 cities will develop their RDTRs before 2022. The evaluation of RDTRs is highly important for Indonesia, specifically to ensure that RDTRs are linked to National and Local development priorities.

The RDTR scenario represents the population distribution through an urban zonification based on land uses and build regulations, as shown by Figure 1, where population settles exclusively in residential zones and according to the maximum population densities described in the RDTR. The RDTR scenario, is programmatic: population and building densities do not follow urban patterns nor population projections; they follow a plan exactly as it is described in the RDTR.

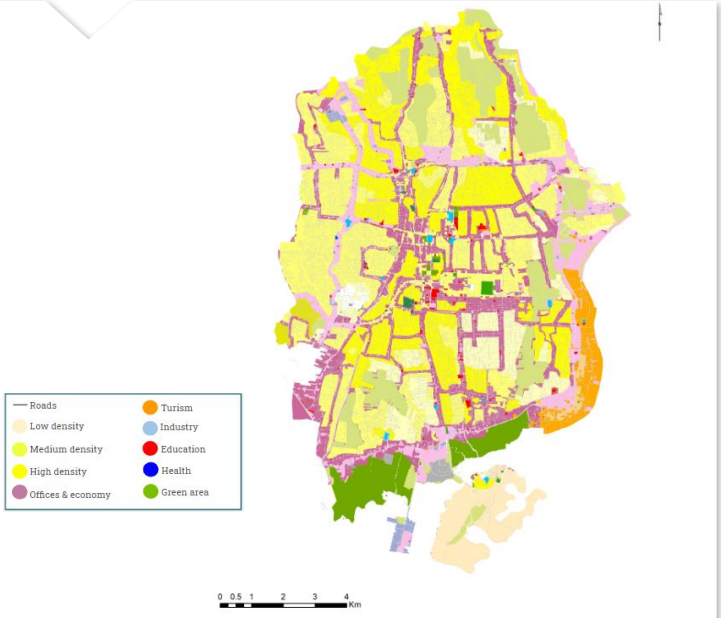


Figure 1. RDTR regulations in Denpasar city.

Urban services included in this assessment covers health facilities, education facilities, public spaces, sports facilities, markets, worship and public transportation. The indicators considered for evaluation are amenities and transport proximity, population density, and energy consumption, as shown by Figure 2.

Figure 2. Indicators for the evaluation of the Base and RDTR scenarios.

What did we find in this assessment? –According to the results, see Figure 3, the RDTR scenario has a population of 874,404 inhabitants, while the Base scenario has 788,589 inhabitants. Population density is 6,871 inhabitants/km² in the RDTR scenario while in the Base escenario it is 6,197 inhabitants/km², representing a difference of 10% between both scenarios. The RDTR is "saving room for growth", but it is failing in improving access to services.

	BASE	RDTR
Population density [Inhab/ km²]	6,197	6,871
Urban footprint [km²]	127	127
Total population [Inhabitants]	788,589	874,404
Percentage of the population with access to transport [%]	48	32.5

Figure 3. Population and footprint indicators.

What can we learn from this assessment? Proximity to public space and public transportation is better in the Base scenario, as shown in Figure 4. Other indicators remain practically the same. This means that, if Denpasar's RDTR is enforced with no other complementary policy, it will eventually worsen the city's conditions: *mainly by reducing the use of public transportation and increasing the use of private vehicles to access education and health facilities or public spaces, which would also increase the emission of GHGs and undermine low-carbon development.*

	BASE	RDTR
High school proximity [%]	97.6	98.3
Health proximity [%]	90.2	93
Public space proximity [%]	28.4	24.9
Percentage of the population with access to transport [%]	48	32.5

Figure 4. Results for main indicators evaluated.

Public Space in Banjarmasin

CASE STUDY

Banjar people used to call Banjarmasin "the city of one thousand rivers". Today, most of the rivers and canals are polluted, hidden, or used as ditches. Instead of planning and implementing a river-based development, Banjarmasin has neglected its potential and has followed a land-based development. Neglect the rivers' existence results in highly complex access to the waterways and limited options for inspection and maintenance. It also produces a growing exposure to flooding hazards. While the city faces important challenges with rivers and channels, Banjarmasin also has an important deficit in public space. In this assessment we modeled the potential effects of transforming rivers and channels into linear parks.

Banjarmasin has successful waterfront public spaces, including the iconic floating market and the Matapura River waterfront walkway. However, as can be seen from Figure 5, access to public spaces in Banjarmasin remains minimal. Similarly to other cities in Indonesia, Banjarmasin struggles to provide high-quality public spaces to its inhabitants. The Base scenario considers that the city makes no significant change in the construction of new public spaces.

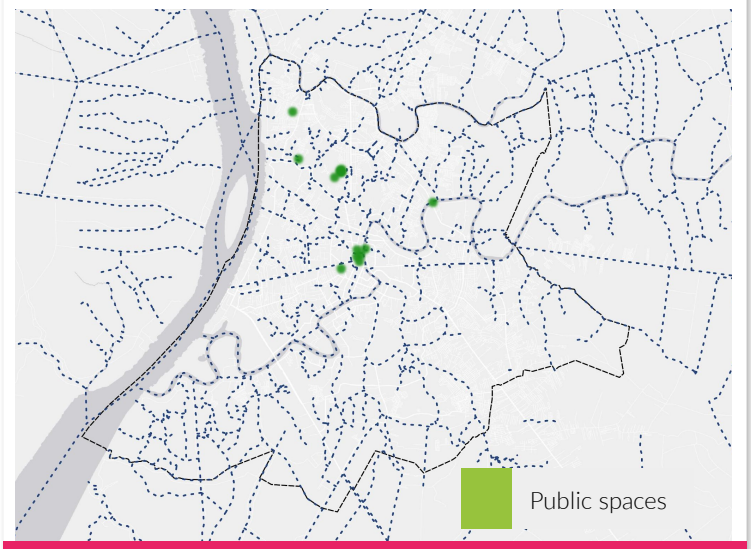


Figure 5. Public spaces in the Base Scenario in Banjarmasin. The black line admin boundaries.

The Alternative scenario considers that the city makes a drastic and ambitious change in river management: all rivers and channels have at least a 5-meter buffer with walkways and green areas. Our hypothesis is that this change would lead to increased access to public space and connectivity, improved access to rivers for inspection and maintenance, and in higher resilience to flooding.

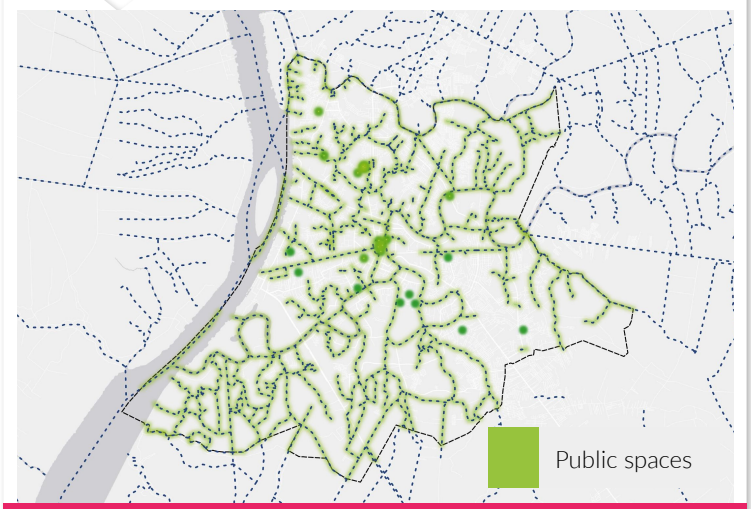


Figure 6. Public Spaces in the Alternative Scenario in Banjarmasin. The black line admin boundaries.

As can be seen from Figure 7, to compare the Base and Alternative scenarios we considered that no significant changes happen in population growth. We modeled one single intervention, which is transforming rivers and channels into linear parks. As can be seen from the Figure 7, this intervention would dramatically change the percentage of population living in a walking-distance to public space. With improved public spaces and connectivity, we can expect easier channel maintenance and inspection, stronger community networks, an increase in economic activity generalized shorter commuting times.

–What trade-offs can we expect? Critical points include the cost of implementing the project and challenges related land management. However, other non-obvious and long-term challenges such as a significant increase on public lighting. This means proper planning for a project like this one, would require both investment and maintenance planning. Of course, public lighting is just one example of many other maintenance costs for infrastructure services.

	BASE	ALTERNATIVE
Total population [inhabitants]	625,481	625,481
Access to public space [% of population]	5.6	96.31
Public lighting [kWh/capita/annum]	12.75	17.36

Figure 7. Scenario comparison for Banjarmasin: direct indicators.

Other Indonesian cities, such as Denpasar, have tackled the cost of maintenance with economic development. With strategic land use changes, entrepreneurship training and economic incentives they have developed urban Ecovillages. These neighbourhoods attract economic activity, which leads to increased city's revenue and available funds for maintenance of public spaces.

In this case study, we developed four scenarios to compare the potential benefits of transforming Bus lines into low carbon transport technologies (BRT lines) in Bandung city. We compared Bus, Diesel BRT, E-BRT and E-BRT with a cleaner electricity mix.

The base scenario considers current transportation routes in the city of Bandung. Public transportation in Bandung is composed of 33 bus lines (shared lane) and 3 Trans-Metro lines (dedicated lane). The coverage radius for shared-lane public transport is 300 meters (see blue buffer in Figure 8) according to international coverage standards, while for dedicated-lane transit (BRT) is 800 meters (as shown in Figure 8 with green buffers).

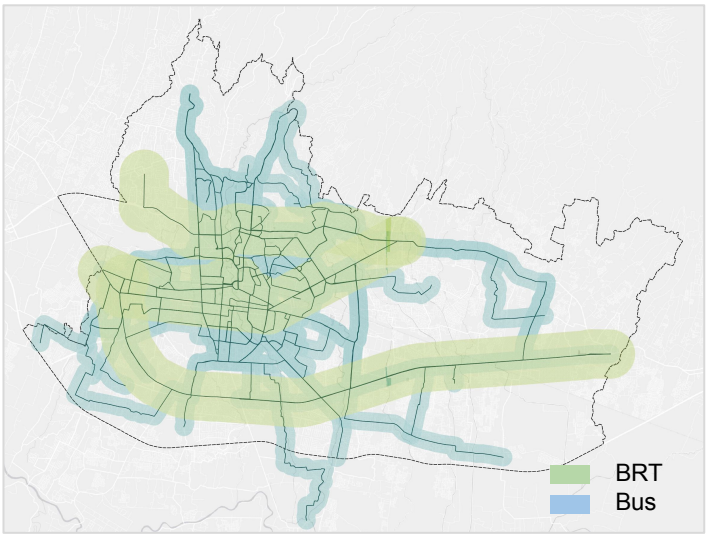


Figure 8. Public transportation coverage area considering present conditions (Base scenario).

The ambitious BRT scenario considers that all Bus lines are transformed into Diesel-based BRT lines. The E-BRT scenario considers that instead of using diesel buses, the city relies on electric buses, while keeping the energy mix as it is in present conditions (mainly based in fossil fuels). Finally, the E-BRT + clean mix low carbon scenario considers that along with the implementation of the E-BRT scenario, the electricity mix shifts to a higher percentage of renewables to reach 0.39 ton CO2/MWh.

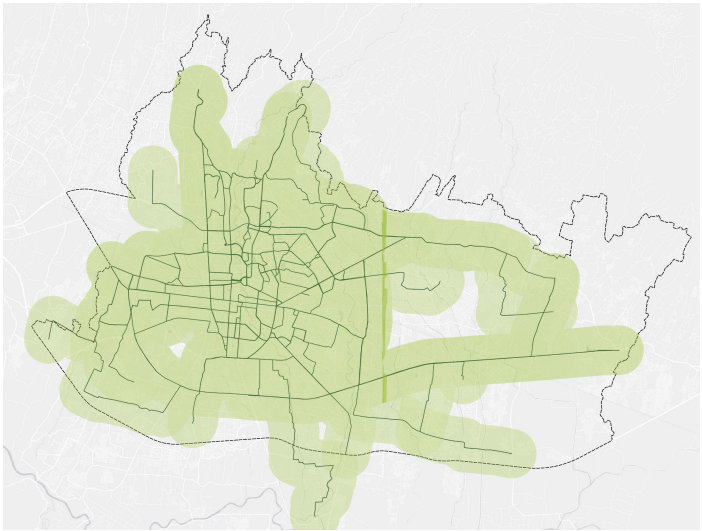


Figure 9. Public transportation coverage area considering scenarios BRT, E-BRT and E-BRT with clean mix.

	BASE	Diesel BRT	E-BRT	E-BRT + Clean Mix
Vehicle kilometers travelled [Million km/day]	48.88	46.09	46.09	46.09
Energy [TWh/day]	4.85	4.67	3.16	3.16
GHG emissions [GgCO2eq/day]	1.23	1.19	1.24	0.91

Figure 10. Scenario comparison for a typical weekday.

As can be seen from Figure 10, vehicle kilometers travelled (i.e. the total of kilometers that commuters travel in a weekday by motorcycle or car) would decrease with the development of the BRT or E-BRT. Energy is expected to decrease with E-BRT as compared to Bus or Diesel BRT; but carbon emissions are expected to rise, except when using a cleaner energy mix.
So, what can we learn from this assessment? –To embrace the full potential of an E-BRT system in Bandung, it will be crucial to develop a low carbon electricity mix.

The core idea of an E-BRT is to provide high-quality transit systems while reducing the emissions of criteria pollutants. But, what happens with energy and GHG emissions? In this case study, we compared existing Bus lines with Diesel BRT, E-BRT and E-BRT with a cleaner electricity mix for Balikpapan city.

We observed that VKT would decrease with the development of the BRT or E-BRT, as compared with Bus. Energy is expected to decrease with E-BRT as compared to Bus or Diesel BRT; but carbon emissions are expected to rise, except when using a cleaner energy mix.

So, what can we learn from this assessment? –To embrace the full potential of an E-BRT system in Balikpapan, it will be crucial to develop a low carbon electricity mix.

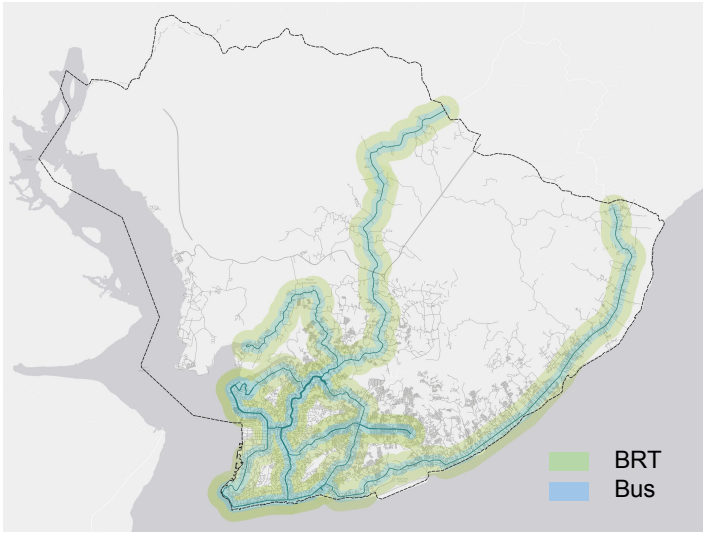


Figure 11. Public transportation coverage area considering present conditions (Base scenario).

	BASE	Diesel BRT	E-BRT	E-BRT + Clean Mix
Vehicle kilometers travelled [Million km/day]	11.45	10.78	10.78	10.78
Energy [TWh/day]	1.13	1.09	0.73	0.73
GHG emissions [GgCO2eq/day]	0.29	0.27	0.29	0.21

Figure 12. Scenario comparison for a typical weekday.

The core idea of an E-BRT is to provide high-quality transit systems while reducing the emissions of criteria pollutants. But, what happens with energy and GHG emissions? In this case study, we compared existing Bus lines with Diesel BRT, E-BRT and E-BRT with a cleaner electricity mix for Semarang city.

We observed that VKT would decrease with the development of the BRT or E-BRT, as compared with Bus. Energy is expected to decrease with E-BRT as compared to Bus or Diesel BRT; but carbon emissions are expected to rise, except when using a cleaner energy mix.

So, what can we learn from this assessment? –To embrace the full potential of an E-BRT system in Semarang, it will be crucial to develop a low carbon electricity mix.

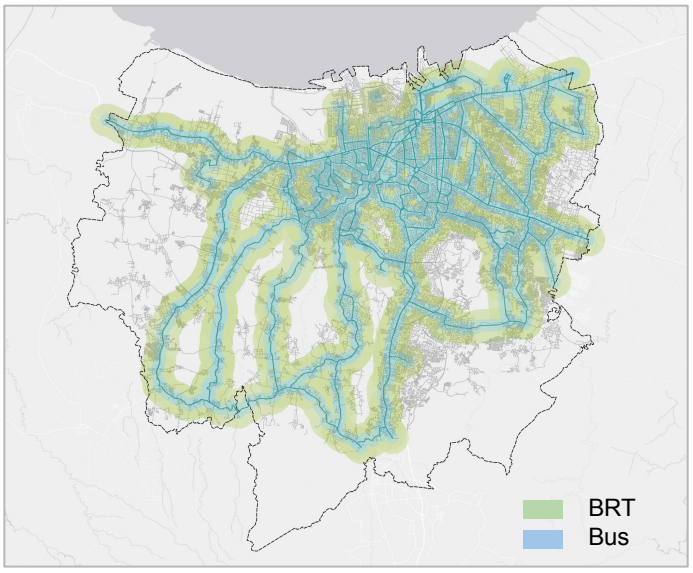


Figure 13. Public transportation coverage area considering present conditions (Base scenario).

	BASE	Diesel BRT	E-BRT	E-BRT + Clean Mix
Vehicle kilometers travelled [Million km/day]	32.81	30.99	30.99	30.99
Energy [TWh/day]	3.25	3.14	2.12	2.12
GHG emissions [GgCO2eq/day]	0.83	0.80	0.83	0.61

Figure 14. Scenario comparison for a typical weekday.

The core idea of an E-BRT is to provide high-quality transit systems while reducing the emissions of criteria pollutants. But, what happens with energy and GHG emissions? In this case study, we compared existing Bus lines with Diesel BRT, E-BRT and E-BRT with a cleaner electricity mix for Solo city.

We observed that VKT would decrease with the development of the BRT or E-BRT, as compared with Bus. Energy is expected to decrease with E-BRT as compared to Bus or Diesel BRT; but carbon emissions are expected to rise, except when using a cleaner energy mix.

So, what can we learn from this assessment? –To embrace the full potential of an E-BRT system in Solo, it will be crucial to develop a low carbon electricity mix.

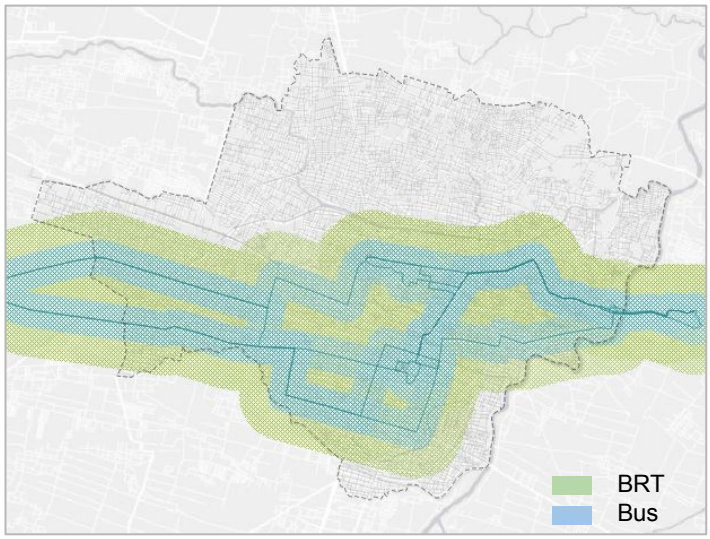


Figure 15. Public transportation coverage area considering present conditions (Base scenario).

	BASE	Diesel BRT	E-BRT	E-BRT + Clean Mix
Vehicle kilometers travelled [Million km/day]	10.27	9.86	9.86	9.86
Energy [TWh/day]	1.01	0.99	0.67	0.67
GHG emissions [GgCO2eq/day]	0.25	0.25	0.26	0.19

Figure 16. Scenario comparison for a typical weekday.

URBAN PERFORMANCE

Case Studies 2020

We acknowledge the invaluable support of the World Bank's Trust Fund for Statistical Capacity Building (TFSCB) in the making this project.
The latest version of Urban Performance was developed at City Planning Labs and is maintained by CAPSUS, UPTech and a community of developers.
Urban Performance is open source and its source code can be found at GitHub: https://github.com/UPTechMX.

CollabData

Case Studies **2020**

CollabData is a digital platform that captures the needs, challenges and ground realities of the communities, strengthens public consultations and simplifies the analysis of collected data with powerful visualizations.

The analysis can be presented in the form of heatmaps, spatial word clouds, emotion maps and gender statistics to transform data into information that can be easily utilized for decision making.

This document addresses two case studies of an annual process during which residents meet together to discuss the issues facing their communities and decide upon priorities for short-term improvements, called "Murenbang". This process is an opportunity to collectively decide the future of the communities and assure that government investment in neighborhoods meets community development needs.

The results of three cases from, Jakarta and Semarang, analyzed using the CollabData tool.

CASE 1: Musrenbang Jakarta

In this case study, we will analyze the results of the **Musrenbang** process (community discussion about local development needs) **conducted in Jakarta**. The public consultation was carried out in three categories; a) transportation, b) energy and mineral resources and c) public works and spatial planning. This case study will focus on the **transportation category.**

This consultation consisted of 5,320 entries, of which 3,785 corresponded to "Public Works and Spatial Planning", 1,335 to "Energy and Mineral Resources", and 200 to "Transportation", see Figure 1. Entries corresponding to Transportation were analyzed. The analysis through heat maps is observed in Figure 2.

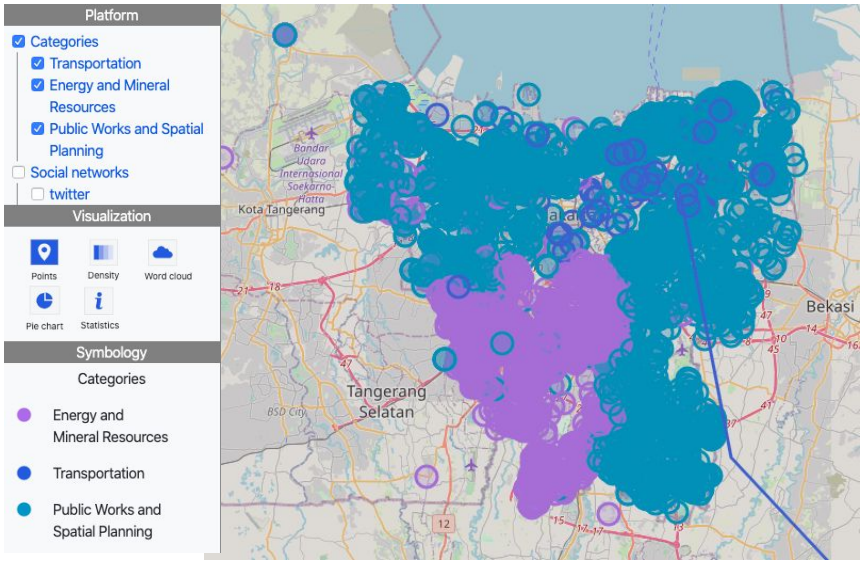


Figure 1. Consultation of Jakarta by category.

Most of the consultations were located in the north-eastern part of Jakarta, as shown by Figure 2.

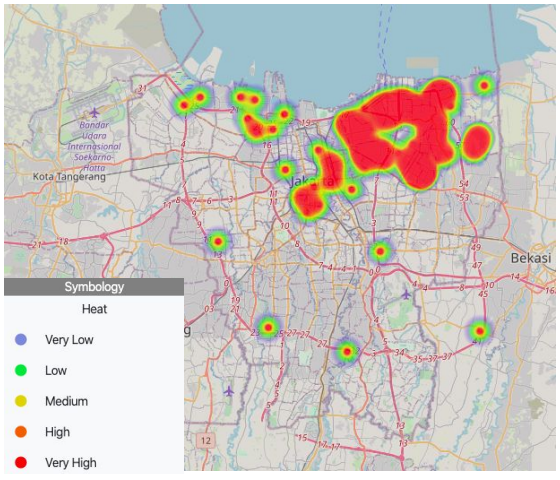


Figure 2. Mapping of information through heat maps.

All the feelings expressed in this consultation were neutral, as indicated by Figure 3..

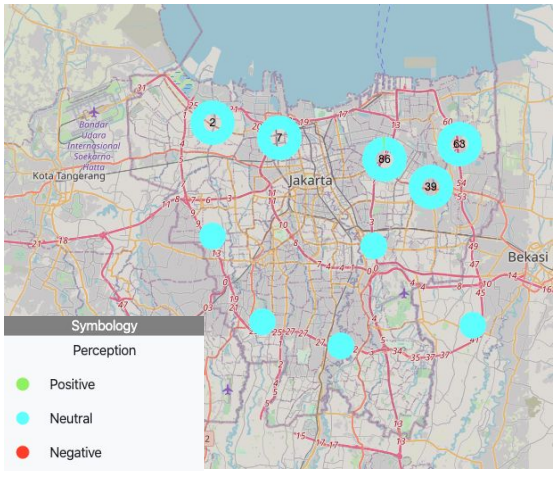


Figure 3. Feelings expressed in the consultation.

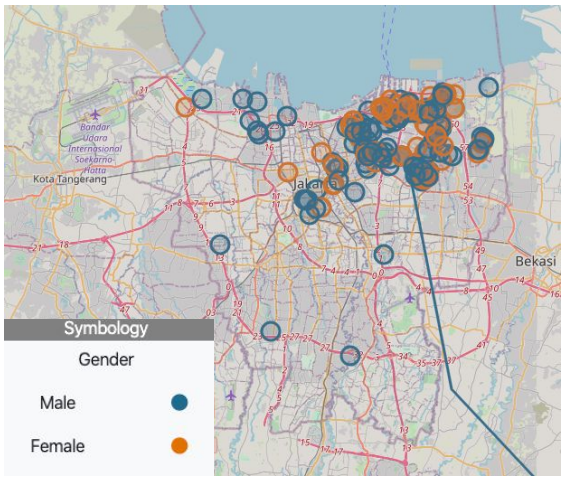


Figure 4. Data on gender in the consultation.

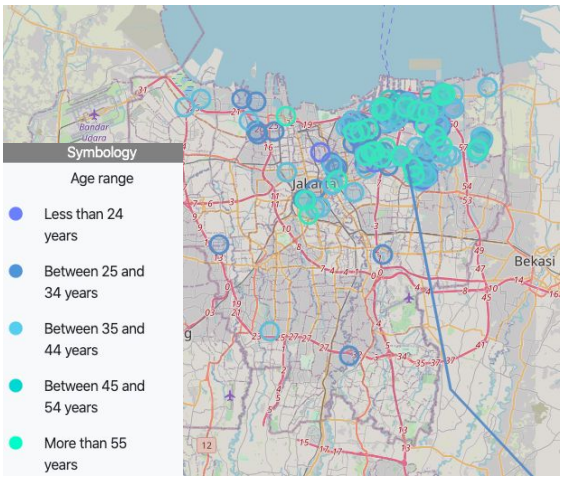


Figure 5. Data on age in the consultation.

Figure 4 shows the gender of the participants in the public consultation. A similar proportion is observed between both sexes, which is a good indicator of gender equality. Regarding age, see Figure 5, approximately a third of the participants are between 45 and 54 years old. The second third of the participants are between 35 and 44 years old. The remaining third ranges from less than 34 to more than 55. This means there is lower participation of young people, however, the average age in the Indonesian population is 30 years. These results can help to rethink the strategies to promote greater participation of some age group, sex or region that is not participating satisfactorily in the consultation.

In conclusion, most of the comments come from the north of Jakarta, so it is recommended to promote participation in other areas of the city. It is also recommended to promote youth participation. The two main problems to deal with are accidents in different areas of the city with 38 opinions, and the lack of visibility at road intersections with 11 opinions, see Figure 6.

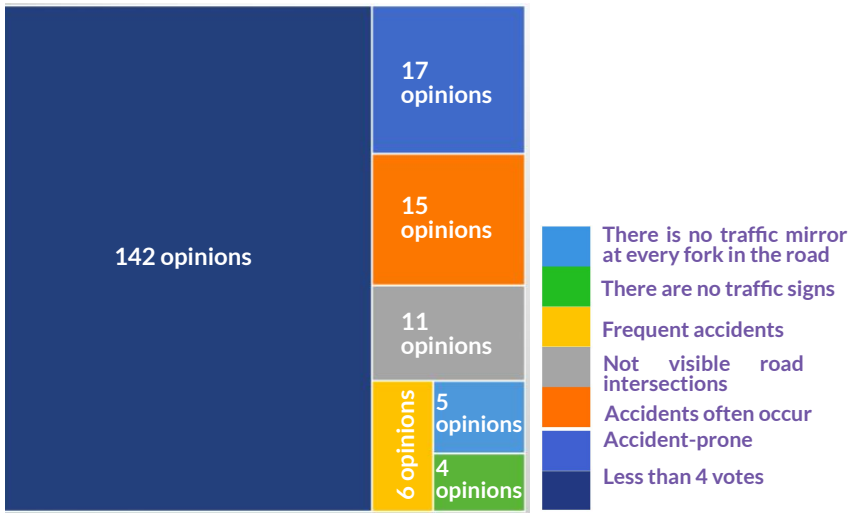


Figure 6. Results of people's opinions in the consultation for the category "Transportation" in Jakarta.

CASE 2: Musrenbang Semarang

In this case study, we will analyze the results of a public consultation, at the village level (**Dana Kelurahan Semarang**), carried out in Semarang to identify and prioritize the main problems directly stated by the inhabitants. The villages Semarang Barat, Semarang Tengah, Semarang Selatan, Semarang Utara, and Semarang Timur will be analyzed.

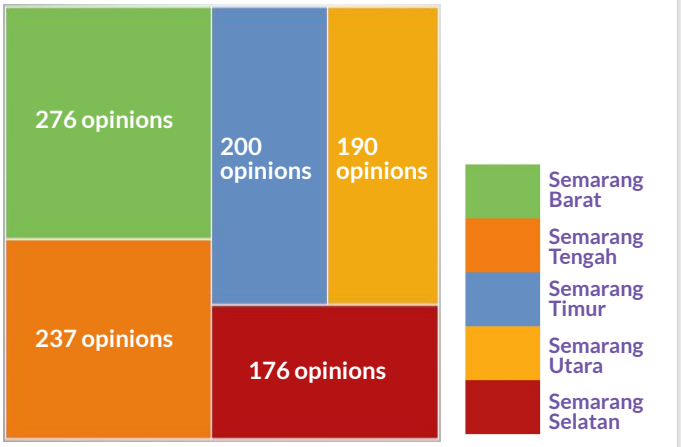


Figure 1. Statistics on the consultation carried out in five villages in Semarang.

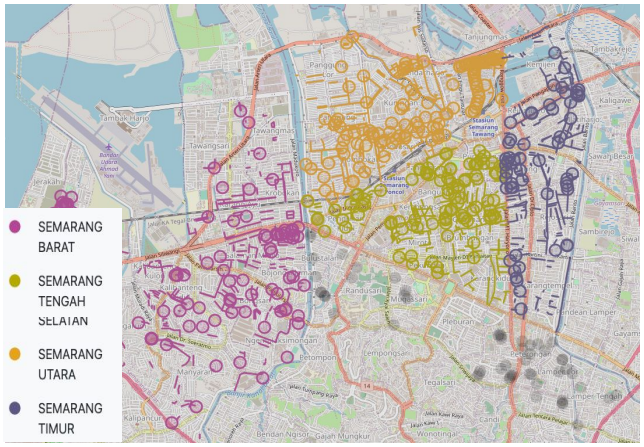


Figure 2. Location of consultations carried out in five villages in Semarang.

In this consultation, 1,079 entries corresponding to five villages namely Semarang Barat, Semarang Tengah, Semarang Selatan, Semarang Utara, and Semarang Timur were analyzed, see Figure 1. The purpose is to know which are the main problems, from the point of view of the inhabitants, for budget placement. In Figure 2 we can see the spatial location of the consultations carried out in the five villages. Figure 3 shows the spatial distribution of the opinions through heat maps. In the analysis of the perception of the comments made by the participants, a neutral opinion was obtained, as indicated by Figure 4.

Figure 3. Mapping of information related five villages through heat maps.

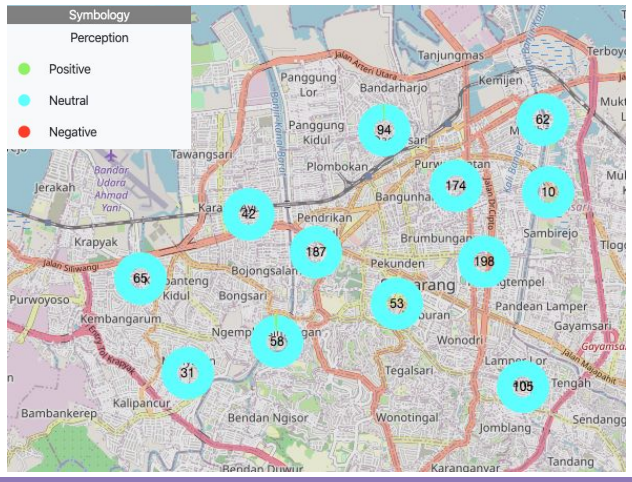


Figure 4. Feelings expressed in the consultation.

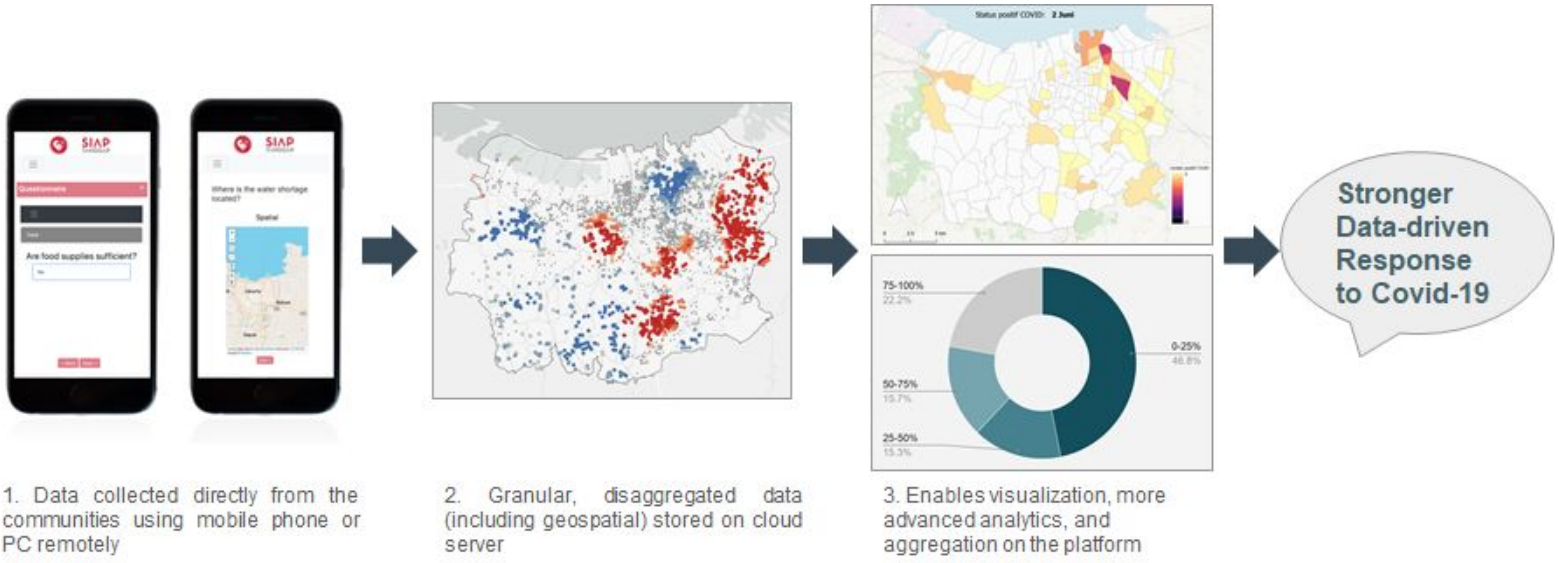
The results of the analysis are mentioned below. In the case of Semarang Barat, the problem with the highest number of opinions is "damaged roads" (32), while the second was "problems with water channels" (27). The rest of the opinions (217) had less than four votes each. Regarding Semarang Tengah, the most urgent problem to solve is "channel issues" (17), the second most important is "streets need paving" (10) and the rest of the opinions (210) with less than five votes each. In Semarang Selatan, the most pressing issue was "improving the flow of water" (12) followed by "floods" (10), "broken water channels" (7) and other options (147) with less than 7 votes. In Semarang Utara, the problem most mentioned by the inhabitants was "traffic jam issues" (13), followed by "damaged roads" (10), then "channel issues" (6) and others (161) with less than 5 votes. Finally, in Semarang Timur, the most mentioned problem was "channel issues" (38) followed by "damaged roads" (13) and other options (149) with less than four votes.

In general, the most mentioned problems in the five villages analyzed are roads and channel issues. As these results are directly obtained from the inhabitants, they are validated as the most important problems to be solved.

CASE 3: Covid-19 Urban Impact Monitoring

This case study captures the deployment of CollabData in Semarang for supporting the city's COVID-19 countermeasure efforts. Using the social monitoring module of CollabData the city managed to collect data from all Kecamatan (urban districts) and Kelurahan (urban wards) remotely as Covid-19 cases peaked in June 2020. The information was helpful for understanding issues such as: Food Security (food prices inflation), Social Assistances distribution, as well as identifying overcrowding hotspots and lacking sanitation, where social distancing and COVID-19 prevention will be challenging.

Deployment of the tool was simple, as the tool used a familiar platform to reach respondents and send reminders. While an 'app version' of the tool is available, the government chose to send the questionnaire links through the widely used WhatsApp application in Indonesia. The instruction to participate in the survey was disseminated via a chain of WhatsApp groups from Kecamatan heads (district level) to the respondents—neighborhood heads. Within a week, about 7,800 users were registered (nearly 80% of the neighborhoods/sub-wards in Semarang) and logging multiple data streams. In just a few days, more than 4,600 data points were collected.



1. Data collected directly from the communities using mobile phone or PC remotely

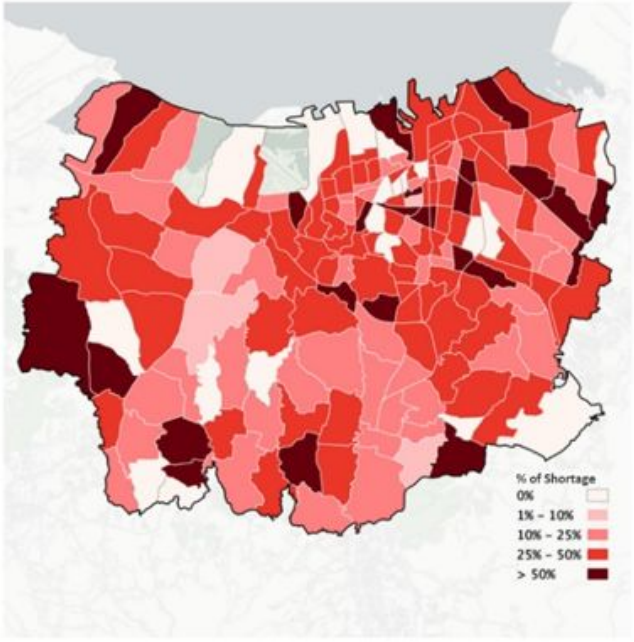
2. Granular, disaggregated data (including geospatial) stored on cloud server

3. Enables visualization, more advanced analytics, and aggregation on the platform

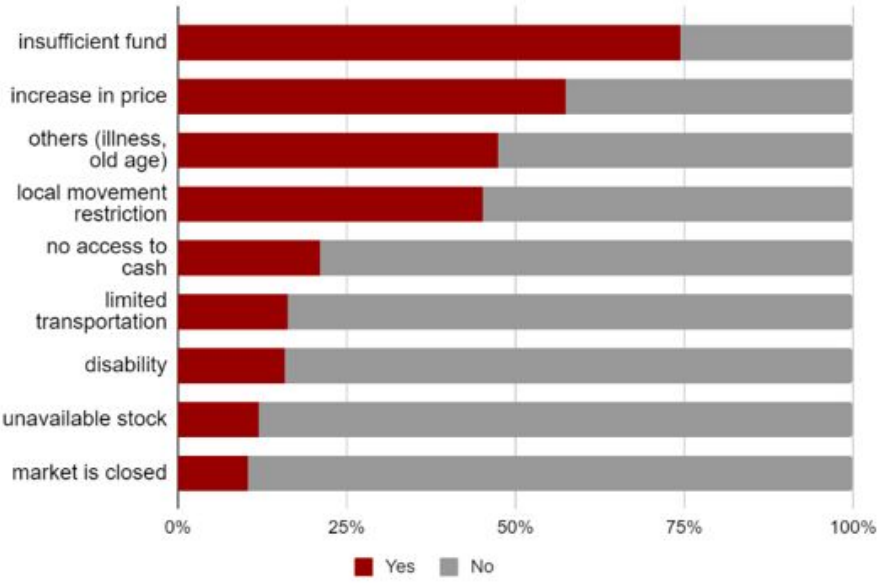
CASE 3: Covid-19 Urban Impact Monitoring

During this first week of deployment in Semarang, the data reported 291 individuals with mild symptoms of COVID-19, 63 suffering severe symptoms, and 31 dead. Two wards signaled the highest per capita rate of weekly infections—critical intelligence for targeting public health resources. Semarang officials' concerns about increased infections due to heightened mobility close during the religious holiday period were validated. Communities reported that 5,042 people had left Semarang city since March 2020, while nearly 2,960 people arrived there in the month previous to the survey. Many did not self-quarantine following travel or report their arrival to the authorities, highlighting the weakness in containment policies and inadequacy of quarantine facilities that led to more targeted local government action as the epidemic progressed.

Meanwhile, the data pointed out that households in one Kelurahan (ward) experienced the highest rates of income cuts in the forms of job layoffs and informal job loss. The survey also offered valuable insights into COVID-related food insecurity issues, pointing to limited funds and price inflation as the most widespread factors in difficulty putting food on the table in six wards. 48 out of 177 (27%) reported more than a quarter of their households facing food shortages, enabling targeted intervention. The data showed disparities with the official Market Price Survey done by the local government, triggering a closer government review.



Distribution of Kelurahan with the percentage of neighborhoods that are reporting more than 25% of their households facing food shortages



Main reasons for difficulty in purchasing foodstuffs

CollabData

Case Studies **2020**

We acknowledge the invaluable support of the World Bank's Trust Fund for Statistical Capacity Building (TFSCB) in the making this project.
CollabData was conceptualized at City Planning Labs. The tools were developed by CAPSUS and are maintained by UPTech and a community of developers.
CollabData is open source and its source code can be found at GitHub: https://github.com/UPTechMX

Urban Planning Tools as Agents of Change:

Collaborative Spatial Data for Sustainable Urban Development in Indonesia

The World Bank Group - City Planning Labs (Lead)
CAPSUS (Private Sector Partner)
Contact for details and additional material: Gayatri Singh, Senior Urban Specialist, Task Team Leader gsingh9@worldbank.org

World Bank City Planning Labs & CAPSUS