METABOLISM
OF CITIES

DATA & URBAN METABOLISM MOOC

A SERIES OF FREE, ONLINE COURSES DEVELOPED TO BRING URBAN METABOLISM KNOWLEDGE AND DATA TO THE GENERAL PUBLIC
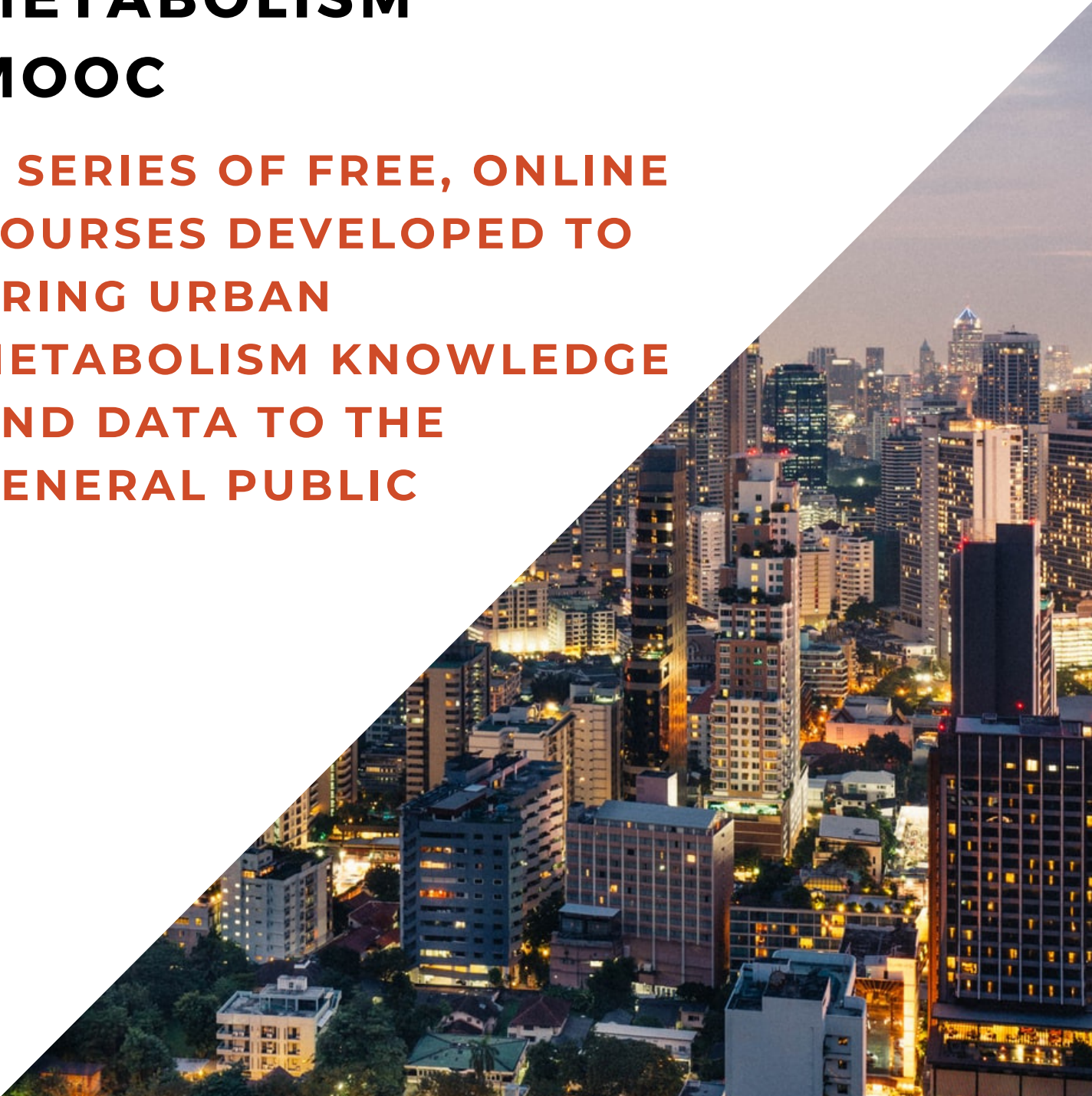
Background

Our mission in Metabolism of Cities is to collaborate on systematically improving the sustainability of cities, by creating and sharing urban metabolism knowledge and accelerating its implementation in policy and practice. In an effort to contribute to the field of urban metabolism in a centralised and accessible way we launched the Metabolism of Cities Data Hub. Initially launched in 2017 was an exercise to collect academic data on material flows, stocks and other relevant data to urban metabolism. We did this to address problems around data scarcity, data accessibility, and scattered nature of data, all of which greatly limit research and monitoring of resource flows.

The prototype of the data hub system was used to gather, visualise and share data in what became a project known as MultipliCity. The platform was trialled for almost two years by our users as well as colleagues from the sibling website Metabolism of Islands, which provided valuable feedback to create a newer and better system launched in early 2020: the Metabolism of Cities Data Hub.

This innovative system allows for crowd-sourcing of data by a network of contributors. We are proud to already have collaboratively-built data dashboards for 65 cities within our Data Hub.

The diversity of cities found on the platform is an accomplishment that was primarily achieved through participants who signed up to an open, online course held by Metabolism of Cities. This course was the first of a three-part series called "Data & Urban Metabolism", consisting of 1) *Data Collection*, 2) *Data Processing* and 3) *Data Analysis* courses. A small-scale trial version of the Data Collection course was organized in both English and in Spanish through the Metabolism of Cities Education Hub. The participants collected data from a city of their choice and at the end of the course were tasked with writing a data-based article which can also be found on the platform.

These first trial courses were encouraging and have yielded great results. Metabolism of Cities developed 10 online modules, with each module consisting of 3-5 instruction videos followed by an exercise.

The English course was a closed-group activity, but the Spanish course was opened to the public and despite limited marketing this course was oversubscribed within a week. Registration was closed at 100 participants; 45 students participated in the actual course. Through the work of these students, the Data Hub library rapidly grew and now features 3,560 documents (datasets, shapefiles, images, reports, policy documents, etc) for 65 different cities across 6 continents.

Course overview

After this successful trial, we now seek to roll out a more polished, well-marketed and large-scale version of this course, in collaboration with partner organisations. We would like to invite your organisation to be part of this endeavour.

This course will be a rehash of the existing Data Collection course. We will use our lessons learned and partner support to improve existing materials and tweak the structure where needed. Consisting of 10 modules, this course will either run as a more intensive 5-week course with two online teaching sessions per week, or a more moderate 10-week course with a single session per week.

The course will be taught in English (additional languages may be made possible by our partners) and its tentative theme will be focused around **African cities**. Participants from other continents are also welcome, but the core objective is to strengthen our African footprint and to add many new African cities to our platform.

In the spirit of inclusivity and accessibility for anyone interested, all of the courses offered by Metabolism of Cities are free of charge.

All of the actual lessons are available online as recorded videos as well as exercises the participants have to complete after each module. In our efforts to promote the research within the field of urban metabolism through an open collaboration we considered it important that all of our course material is available under a **Creative Commons License** (CC 4.0. BY). This way we ensure that the data collected by our community is not only centralised within our platform but that it can be downloaded, re-used and expanded upon by all. Metabolism of Cities wants to remove barriers that exist around finding and working with urban metabolism data.

THE EXACT DETAILS OF THIS COURSE ARE STILL TENTATIVE AND THE FINAL OUTLINE WILL BE DECIDED UPON IN COLLABORATION WITH THE PARTNER ORGANISATIONS. HOWEVER, THE OUTLINED STRUCTURE IS BASED ON OUR FIRST TRIALS AND SHOULD BE A FAIR REPRESENTATION OF THE FINAL COURSE.

With the entire course as well as the exercises available online, participants will not be required to attend the online classes. All actual course content can be covered independently. However, from experience it has become clear that holding class sessions is great for community building, for clarification and direct student support, and to ensure a greater participation and retention rate amongst students. In the current format, class sessions last one hour, and they feature the instructor discussing submitted homework (highlighting both common mistakes and exemplary submissions), followed by a Q&A block with the students to discuss specific issues.

If the new cohort becomes too large, we may need to look at alternative structures. Splitting up the group - potentially organised by country - and having multiple instructors available may be a solution.

Upon completion of the course, participants will have gained valuable skills around the basic concepts of urban metabolism and data collection. This course will follow a "learn while doing" concept in which students receive instructions on the type of data and information that is required to slowly unpack the urban metabolism in a city. Each student will collect data on a city of their choice throughout their course and will learn how to use the Metabolism of Cities Data Hub to upload their data. This will ensure that participants develop skills required to search for and work with data in diverse formats and from a variety of sources. Their work will directly support an open, global project and benefit the data dashboard of their own city.

ONLINE COURSE
DATA & URBAN METABOLISM
DATA COLLECTION

METABOLISM OF CITIES

Data and Urban Metabolism: Data Collection

10 modules

ONLINE COURSE
URBAN METABOLISM FOR POLICY MAKERS

METABOLISM OF CITIES

Urban Metabolism for Policy Makers

8 modules

CURSO CORTO
METABOLISMO URBANO Y MANEJO DE DATOS
PROCESAMIENTO DE DATOS

METABOLISM OF CITIES

Metabolismo urbano y manejo de datos: Procesamiento de datos

9 modules

Target audience

The course is open to anyone with an interest in urban sustainability. This could be a specific interest in urban metabolism, but also a broader sustainability interest. It is a good first step for anyone interested in jumping into the field without knowing where to start and being able to get an introduction to the subject with space for any questions they might have. However, the course also encourages and invites many individuals who have already worked in the field of urban metabolism to share if they choose, their own data collection previously done outside of the course. Past participants have included individuals with all sorts of backgrounds ranging from degrees in science, architecture, politics and both university students and teachers who were interested in the course.

Upon completion of the course, students are provided a digital certificate of completion. They will furthermore receive online points and badges, based on their contributions, and are featured in the Community Portal of Metabolism of Cities. Lastly, they can directly see the impact of their work as their data dashboard transforms from an empty skeleton to a well-progressed state. These various rewards benefit a wide audience of different students - from those simply wanting to contribute, to people who want to learn new skills, and those seeking to strengthen their CV.

Time frames

We hope to start this course in **March 2021**, but timing is flexible. Most of the material is already developed and we have streamlined the production of instruction videos. January and February 2021 can be used to market the course and handle logistics. After engaging in this first Data Collection course, we hope to continue producing the other two courses together with our partners throughout 2021.

We see this course as a joint experiment into crowdsourcing urban sustainability data, and building a community around this work. There are many additional courses, research, and activities that can be done if we do this successfully.

Join us in this experiment!

How to get involved?

SPONSOR

Metabolism of Cities is able to run projects on a bootstrapped budget. Currently, minimum baseline funds have been secured to ensure logistical support during the course. Most of the course production work is secured through volunteer efforts by Metabolism of Cities members. However, sponsors provide funds that allow us to further improve the development, management and dissemination of this course. Funding would go towards improved video editing and recording, design, administrative support, and development improved data uploading tools.

PARTNER

A Partner organisation commits to provide in-house support to assist with the development of the course. The exact contribution can be discussed and may consist of providing support around the course development itself including content production, video editing and recording support, class supervision, or assistance with the communication and dissemination efforts around the course
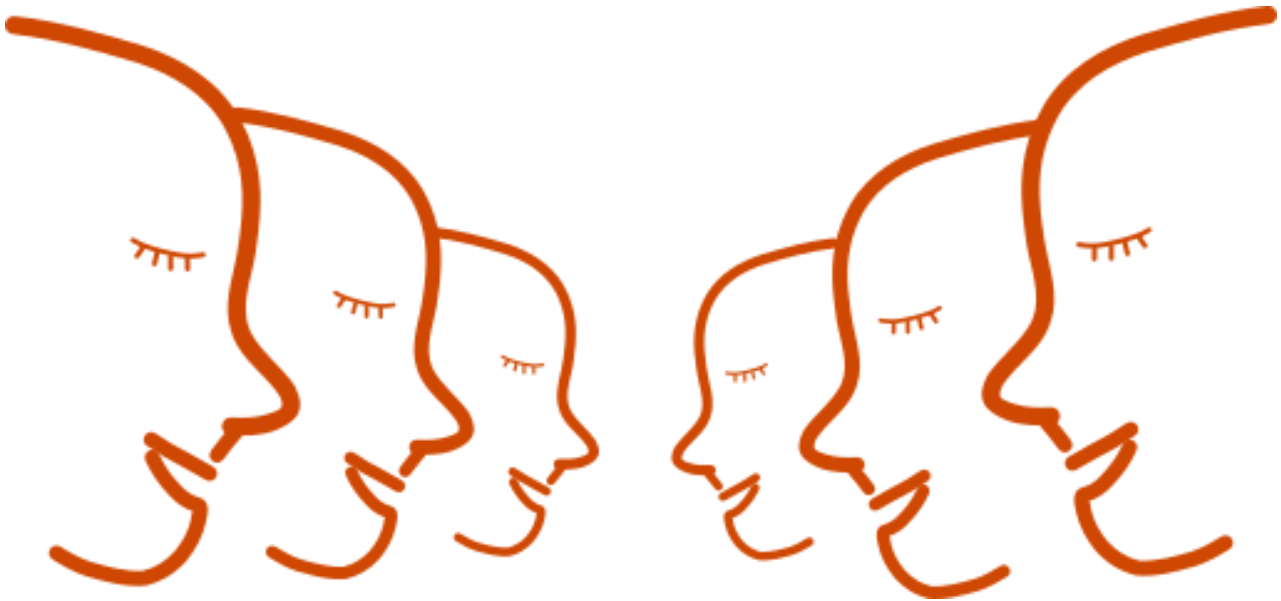
SUPPORTER

Supporting organisations help promote the course with their existing networks. They commit to sharing course information on social media and help the recruitment of a dedicated student body, especially from within African cities.

Interested? Let's chat!

CONTACT PAUL HOEKMAN AT
PAUL@METABOLISMOFCITIES.ORG

Testimonies from past participants

"I found it interesting to be able to understand a city through a stocks and flows perspective. I also loved the idea behind Metabolism of Cities being a platform that is helping cities and communities by collecting data in one place that can then be used to improve how they function."
-Mariella Uchida Yamauchi*

"It's a very interesting couse and the way it's been carried out is very simple. Paul [the Metabolism of Cities instructor] explains clearly what needs to be done and what you need to look for, which is very good. I would like to share the teachings from this course with my students, they have already learned about industrial ecology and sustainability. Now, I would like to introduce them to urban metabolism. I would also like to share the data I have collected with authorities from my city so they can visualise what is happening in our environment."
-Germán Cuevas*

"Deconstructing an entire city and finding out how it functions is a process that has allowed me to view it in an entirely new way. I think we tend to think of cities as separate entities that somehow seem to be running by itself, almost independently from other cities. Urban metabolism forces us to see how everything is connected and reveals the shortcomings a city may have from urban planning to quantifying its contribution to global warming.
The importance of data collection is that it can become the solid evidence we need for policies to be passed in congress, parliaments and governments around the world. They are numbers that translate to facts that have the power to change our future in the right direction."
-María Gracia Yepez

*These testimonies have been translated from Spanish

SCREENSHOTS

Some sample screenshots taken from

education.metabolismofcities.org

(containing online courses)

and

data.metabolismofcities.org

(the data platform)

Data and Urban Metabolism: Data Collection

Module 01: Introduction

Module 02: Context

Module 03: Biophysical Characteristics - PART A

Module 04: Biophysical Characteristics - PART B

Module 05: Infastructure - PART A

Module 06: Infastructure - PART B

Module 07: Stocks and Flows - PART A

Module 08: Stocks and Flows - PART B

Module 09: Actors

Module 10: Data Articles

Participant list

Syllabus

Module 05: Infastructure - PART A

| 1: Video | 2: Video | 3: Video | 4: Video | 5: Video |

Infastructure - Introduction

Download video

✓ I completed this segment

🔒 Edit video

Discussion and questions
Leave a comment

| H | B | I | 🔗 | </> | 99 | ⋮☰ | ☰ | ☷ | | ❓ Help |

🔗 Add attachment(s)

💬 Comment

This is an open source, community effort
Join us now!

✊ Community portal   ✉ Subscribe   ☰ View open tasks

🗛 Translate ▾

Browse all Metabolism of Cities projects

▶ Media

Library

Multimedia Library

Circular Metabolism Podcast

👥 Community

UM Community Hub

🖧 Data Platforms & Tools

Metabolism of Cities Data Hub

Stocks and Flows Database Schema

Stocks and Flows Data Hub

Online Material Flow Analysis Tool

PlatformU

Global Urban Metabolism Dataset

🎓 Education

Metabolism of Cities Education Hub

Urban Metabolism & Minorities

Metabolism of Cities Living Lab

🖵 Conferences & Events

ASCuS Conference 2020

Seminar Series 2019

Data and Urban Metabolism:
Data Collection

Module 01: Introduction

Module 02: Context

Module 03: Biophysical
Characteristics - PART A

Module 04: Biophysical
Characteristics - PART B

Module 05: Infastructure -
PART A

Module 06: Infastructure -
PART B

Module 07: Stocks and Flows -
PART A

Module 08: Stocks and Flows -
PART B

Module 09: Actors

Module 10: Data Articles

Participant list

Syllabus

Data and Urban Metabolism: Data Collection

Module 01: Introduction

Type	Duration	Status
1: Video - Global environmental challenges		Pending
2: Video - What is urban metabolism?		Pending
3: Video - Material accounting approaches		Pending
4: Exercise - Exercise: write an introduction city profile		Pending

Module 02: Context

Type	Duration	Status
1: Video - Introduction to the data uploading process		Pending
2: Video - Working with Shapefiles	7 min	Pending
3: Video - City boundaries		Pending
4: Video - Finding and uploading economic information		Pending
5: Video - Finding population data		Pending
6: Video - Finding policy documents		Pending
7: Exercise - Collecting baseline information for layer 1		Pending

Module 03: Biophysical Characteristics - PART A

Type	Duration	Status
1: Video - Biophysical Characteristics: Soil		Pending
2: Video - Biophysical Characteristics: Trees		Pending
3: Video - Biophysical Characteristics: Biodiversity		Pending
4: Exercise - Find and upload relevant documents		Pending

Module 04: Biophysical Characteristics - PART B

Type	Duration	Status
1: Video - Biophysical Characteristics: Bodies of water		Pending
2: Video - Biophysical Characteristics: Rainfall and temperatures		Pending
3: Video - Biophysical Characteristics: Mineral Deposits	8 min	Pending

Module 05: Infastructure - PART A

Type	Duration	Status
1: Video - Infastructure - Introduction	9 min	Pending
2: Video - Photo management	11 min	Pending
3: Video - Infrastructure: Agriculture, Forestry and Fisheries	7 min	Pending
4: Video - Infrastructure: Water	15 min	Pending
5: Video - Infrastructure: Electricity	5 min	Pending

Module 06: Infastructure - PART B

Type	Duration	Status

Cities

⇅ Sort order: **Alphabetically**   Total documents   Completion percentage

Below is an overview of all city that our community are currently working on. The completion rate is an estimate of how many of the layers have *at least* one document -- this is not an exact indicator as the quality and completeness of these document is only verified once we enter our next phase of data processing. Would you like to help? Join our community, connect through our forum, or do our free and open online course on data collection.

Alajuelita

◎ 115 documents

🗺 Context   ▬▬▬▬▬▬▬

🌲 Biophysical...   ▬▬▬▬▬▬▬

📈 Infrastruct...   ▬▬▬▬▬

⤬ Stocks and ...   ▬

✓ 71% data collection completion

🏢 **Explore city**

🖐 Contribute

Anadia

◎ 84 documents

🗺 Context   ▬▬▬▬▬▬▬

🌲 Biophysical...   ▬▬▬▬▬▬▬

📈 Infrastruct...   ▬▬▬▬▬

⤬ Stocks and ...   ▬▬▬▬▬

✓ 70% data collection completion

🏢 **Explore city**

🖐 Contribute

Arequipa

◎ 28 documents

🗺 Context   ▬▬▬▬▬▬▬

🌲 Biophysical...   ▬▬▬▬▬▬▬

📈 Infrastruct...   ▬

⤬ Stocks and ...   ▬

✓ 25% data collection completion

🏢 **Explore city**

🖐 Contribute

Aveiro

◎ 30 documents

🗺 Context   ▬▬▬▬▬

🌲 Biophysical...   ▬▬▬▬▬
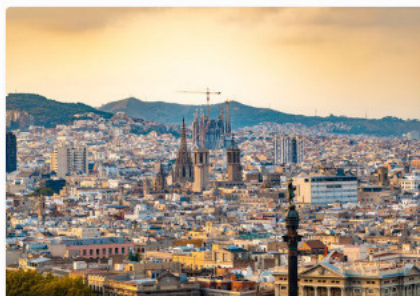
📈 Infrastruct...   ▬

Barcelona

◎ 124 documents

🗺 Context   ▬▬▬▬▬▬

🌲 Biophysical...   ▬▬▬▬▬▬
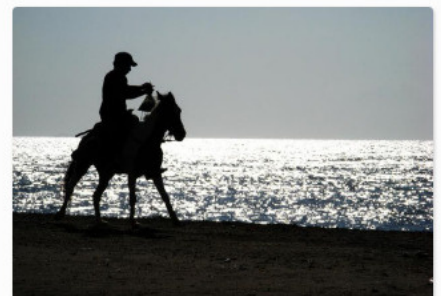
📈 Infrastruct...   ▬▬▬

Barranquilla

◎ 70 documents

🗺 Context   ▬▬▬▬▬▬▬

🌲 Biophysical...   ▬▬▬▬▬▬

📈 Infrastruct...   ▬▬▬

Bogotá

🏠 Context   Biophysical   Infrastructure   Stocks and flows   Browse library ▾   👥 Community ▾

Bogotá

This is the data dashboard for Bogotá. This is a work in progress, and you can help!

Learn more

+
−

Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

View full overview map

City Library

📈 **Datasets** `11`

Explore datasets on material flows, stocks, consumption, and more

📖 **Publications** `23`

Academic literature, reports, and publications published in peer-reviewed journals

🌐 **Maps** `10`

View boundaries, micro-territorial units, infrastructure maps, and more

🖼 **Multimedia** `3`

Photos, videos, data visualisations, and more

Progress

🗺 **Context**

🌲 **Biophysical charact...**

📊 **Infrastructure**

⤬ **Stocks and flows**

Items added last 14 days

20

Top contributer

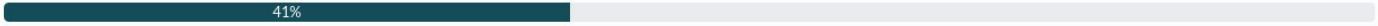**YINA MARCELA LARROTTA GIL**

View all contributors

🤝 **Get involved**

Community Portal

Cape Town

🏠   **Data collection**   Processing   Analysis   👥 Community ▾

Progress

⊞ View all cities

| 41% |

˅ View documents (85)   ˅ View untagged documents (53)

Layers

👥 Layer 1: Context

🌲 **Layer 2: Biophysical characteristics**

🏭 Layer 3: Infrastructure

✖ Layer 4: Stocks and flows

🖼 Extra: General photos

📄 View entire worksheet

ℹ This layer looks at the biophysical properties of the city, including soil, land, ecosystems, climatological characteristics, geology, and more.

Data and information to obtain

2.1. Soil type and composition	⧉
2.2. Trees	🌲
✔ 2.3. Biodiversity	🌷
2.4. Bodies of water	≋
2.5. Average temperatures	🌡°
2.6. Rainfall	🌧
✔ 2.7. Mineral deposits	◈

Discussion and questions

👤 **Kim Finlay**   4 months ago

Where would one put air quality data? The open data portal on the city's website has 3 years worth of air quality data https://web1.capetown.gov.za/web1/OpenDataPortal/DatasetDetail?DatasetName=Air%20quality

👤 **Paul Hoekman**   4 months ago

Hi Kim,

This would go to EMISSIONS TO AIR, layer 4: see here.

Reply

H **B** *I* 🔗 </> ❝ ≣ ≣ ≣	❓ Help

📎 Add attachment(s)

Cape Town

🏠   Context   Biophysical   Infrastructure   **Stocks and flows**   Browse library ▾   👥 Community ▾

✖ Layer 4: Stocks and flows

4.01. Extraction: Fishing

Title	Type	Author(s)	Year
Fish catch	📊 Datas...		

4.02. Extraction: Agriculture

Title	Type	Author(s)	Year
Agricultural production	📊 Datas...		

4.04. Extraction: Mining

Title	Type	Author(s)	Year
Mineral extraction	📊 Datas...		

4.06. Flows: Consumption

Title	Type	Author(s)	Year
City-wide water consumption	📊 Datas...		
Conceptualizing Household Energy Metabolism: A Methodological Contribution	Journal ...	Strydom *et al.*	2019
Social MFA: Scrap Metal in the Context of Cape Town	Thesis	Logan Gardner	2018
Flows and fates of nickel--cadmium batteries in the City of Cape Town	Journal ...	Mason-Jones and von ...	2010
Overview of cadmium flows (kg) from NiCd use in Cape Town in 2005	Data vis...	Mason-Jones and Blott...	2010
A material flow analysis of wood and paper in Cape Town: is there potential to redirect flows in fo...	Journal ...	Nissing and von Blottnitz	2007

4.08. Stocks: Buildings

Title	Type	Author(s)	Year
The Magnitude and Spatial Distribution of In-Use Zinc Stocks in Cape Town, South Africa	Journal ...	Beers and Graedel	2004
The Magnitude and Spatial Distribution of In-use Copper Stocks in Cape Town, South Africa	Journal ...	Van Beers and Graedel	2003
The building stones of Cape Town: a geological walking tour	Book	Cole and I.	2002
Provenance studies for stone from the Castle gateway, Cape Town	Journal ...	Hall and Moore	1993

4.09. Stocks: Infrastructure

Title	Type	Author(s)	Year