ECOLOPES

ECOlogical building enveLOPES: a game-changing design approach for regenerative urban ecosystems

H2020-FET-OPEN-2021-2025

Action number 964414

D1.2: Preliminary project management and risk and quality assurance plan

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Abstract: The objective of this document is to define (i) the guidelines that will be followed by the Consortium members to ensure high quality research, development and reporting; (ii) measures to be taken in case of detected or prognosticated quality flaws; (iii) a refined list of research and performance indicators for each activity that will be evaluated during quality monitoring; and (iv) quality assurance responsibilities in the Consortium.

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HISTORY

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0.1	12/12/2021	ToC creation	Anne Mimet, Verena Vogler, Wolfgang Weisser
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EXECUTIVE SUMMARY

The Preliminary Risk and Quality Assurance Plan (RQAP) presented in this report (D1.2) defines the general approach to risk and quality assurance in the ECOLOPES project, and thus outlines the specific procedures to be followed for an effective communication, documentation, research and software development, deviation identification and correction throughout the project. The RQAP will guide and monitor scientific and technical outputs, detect risks and take corrective measures as necessary with the help of a Quality and Risk Manager (QRM). The final version of the Risk and quality assurance plan will be presented in D1.7 in M36.

D1.2 is organised in six sections: (1) introduction; (2) management structure and quality assurance responsibilities; (3) Communication procedures and reporting; (4) ensuring high quality research and development; (5) Procedures for Risk assessment and contingency strategies; and (6) research and performance indicators.

(2) Section 2 defines a hierarchical organisational structure, consisting of the Coordinator (CO), the Exploitation and Dissemination Manager (EDM), the Quality and Risk Manager (QRM), and the Work Package Leaders (WP Leaders). Furthermore, three groups are formed that include members of the Consortium or external partners that have specific responsibilities: The General Assembly (GA), the ECOLOPES Project Management Board (PMB), and the End User Advisory Board (EUAB).

(3) Section 3 contains the outline of communication procedures within the consortium as well as procedures for the production of reports and deliverables. The communication between the partners of the Consortium will take place on a daily basis and at meetings arranged for this purpose. Daily communication will be ensured through regular e-mail contacts, the use of the project's Teams platform, a SharePoint document repository and a code repository on GitLab/ GitHub. Procedures for the production of reports and deliverables include document templates, file naming and version numbering protocols as well as formats to be used for various purposes. Examples for templates, where appropriate, are provided in the Appendix.

(4) Section 4 briefly outlines the measures that the Consortium will take to ensure high quality research and software (SW) development. In respect to high quality research specific steps are introduced for publications in journals and conferences. In regard to SW development the applied methodologies and controls both at the process level and at the product level will be introduced in the following version of this deliverable.

(5) Section 5 discusses procedures for the identification and management of risks as well as the measures taken towards addressing non-conformity and quality flaws. The identification of risks is ensured through self-assessment and originates from a "top-down" or "bottom up" approach triggered by the CO or each project member respectively. In addition, the section describes the procedure for corrective actions beginning with its scope and describing the steps in detail.

(6) Lastly, section 6 presents the list of research and performance indicators for each activity against which the evaluation of the progress of each activity will be performed.

ABBREVIATIONS AND ACRONYMS

RQAP	Risk and Quality Assurance Plan
SW	Software
CO	Coordinator
EDM	Exploitation and Dissemination Manager
QRM	Quality and Risk Manager
WP	Work Package
GA	General Assembly
PMB	ECOLOPES Project Management Board
EUAB	End User Advisory Board EUAB
DEP	Dissemination and Exploitation Plan

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1 INTRODUCTION

The Risk and Quality Assurance is an important task to be carried out during the entire lifetime of the project. For ECOLOPES it implies that the developed ECOLOPES system must be designed in accordance with the formulated Work Plan (1.3.3. WT3 Work package descriptions, Grant Agreement number: 964414 — ECOLOPES — H2020-FETOPEN-2018-2020 / H2020-FETOPEN-2018-2019-2020-01), and the objectives outlined there to meet the requirements and validation. Further, it must be in compliance with the specification of individual modules; and it must adhere to broadly acceptable quality standards. Thus, the main goals of the Risk and Quality Assurance Plan (RQAP) in ECOLOPES are: First, the summary of the organisational structure and the risk and quality assurance responsibilities assigned among the ECOLOPES consortium; second, the outline of guidelines that will be followed by the members of the Consortium to ensure high quality communication and reporting. These guidelines cover in particular the establishment of communication procedures that will be followed by all partners of the consortium partners, documentation of the project's progress, production of high-quality deliverables on time and specification, in accordance with the Work Plan). Third, the outline of measures to ensure high quality research and software development; forth, the description of procedures for the identification of scientific, technical or dissemination and exploitation risks, or deviations from the Work Plan and contingency strategies to address these risks; and ultimately, the presentation of a list of research and performance indicators for each research activity that will be evaluated during quality monitoring. The outlined Risk and Quality Assurance Plan (RQAP) is a preliminary version of the final document that will be submitted by month 36 (D1.7). It will guide and monitor scientific and technical outputs of the ECOLOPES project, detect risks and take corrective measures as necessary with the help of a Quality and Risk Manager (QRM).

2 MANAGEMENT STRUCTURE AND QUALITY ASSURANCE RESPONSIBILITIES

The organisational structure in ECOLOPES has been designed in such a way that it (i) provides an efficient decision-making structure; (ii) ensures the involvement of all partners in decision-making processes; (iii) provides efficient management procedures that will keep the project performing on time, with high quality of results and within the budget; (iv) ensures smooth communication with the European Commission; (v) involves key experts from outside into the project steering procedure; and (vi) provides a mechanism for the prevention and resolution of disputes. In order to maximise the overall efficiency of the work on the project, a clearly defined hierarchical project management structure has been set up (Figure 1). All responsibilities and competencies are divided among: The Coordinator (CO), the Exploitation and Dissemination Manager (EDM), the Quality and Risk Manager (QRM), and the Work Package Leaders (WP Leaders). Furthermore, three groups are formed that include members of the Consortium or external partners that have specific responsibilities: The General Assembly (GA), the ECOLOPES Project Management Board (PMB), and the End User Advisory Board (EUAB).

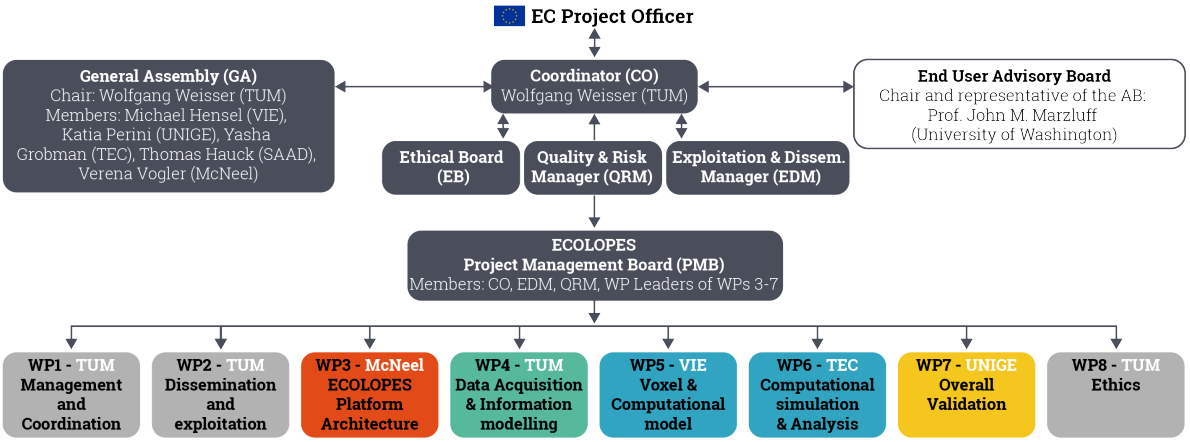

Figure 1: The hierarchical project management structure of ECOLOPES.

2.1 Individual Responsibilities and Competencies

2.1.1 Project Coordinator (CO)

Prof. Dr. Wolfgang Weisser of TUM acts as the Coordinator (CO) of ECOLOPES. The CO is responsible for the establishment and monitoring of efficient communication flows within the Consortium; to monitor the project's progress according to the Work Plan and budget established in the contract; to resolve any conflicts within the project following the corrective mechanisms for conflict resolution; to coordinate the meetings of the GA and PMB; to monitor the quality of deliverables; to coordinate the Consortium's representation at major meetings. The CO also serves as the official interface between consortium and European Commission.

2.1.2 Exploitation and Dissemination Manager (EDM)

Prof. Dr. Ferdinand Ludwig of TUM acts as the ECOLOPES exploitation and dissemination manager (EDM). The EDM is in charge of the coordination and follow-up of the dissemination and exploitation of results, that will be formulated in the dissemination and exploitation plan (DEP). This strategy will ensure the full exploitation of results in scientific and economic terms. Further, the EDM will: (i) monitor the on-going project work, identifying the innovation and exploitation potential of the individual technologies being developed; (ii) instigate recommendations for IPR protection, and develop an appropriate IPR protection plan through the lifetime of the project and beyond; (iii) outline and update the exploitation plan for the individual technologies and ECOLOPES as a whole; (iv) monitor the publication activities of the partners and prevent any disclosure of confidential information that might affect the exploitation or the IPR protection in a negative way; and (v) report on exploitation and IPR creation and protection within the project to the CO and GA.

2.1.3 Quality and Risk Manager (QRM)

Dr.-Ing. Verena Vogler of MCNEEL acts as the Quality and Risk Manager (QRM) in the ECOLOPES project. The QRM is responsible to monitor risks with respect to scientific objectives and to ensure that the project achieves its technological objectives. This involves the following tasks: Monitoring risks with respect to scientific objectives and to technical implementation, and adjusting manpower assignment together with the CO and the WP Leaders; the quality of the deliverables from the scientific and technical point of view; to work closely in matters of quality management and work planning, and to coordinate and lead cross scientific and technical WP meetings. Further, the QRM will establish a platform to support knowledge sharing, transfer and storage of key documents, document lifecycle management

and internal communication between consortium partners. After each major stage of the project, the QRM will conduct a risk assessment.

2.1.4 Ethics Manager (EM)

Dr. Anne Mimet of TUM acts as the ECOLOPES Ethics Manager (EM). The EM is responsible for addressing ethical questions that come up during the project and for making sure that the deliverables of WP8 are addressed.

2.1.5 Work Package leaders (WP leaders)

The project is divided into Work Packages (WP) with specific objectives. Each WP is assigned with a WP leader, who has a number of responsibilities including (i) plan the work of the WP, in coordination with all partners involved; (ii) ensure that the time schedule is maintained; (iii) initiate corrective actions for project deviations, if needed; (iv) consolidate partner information and prepare the reports for submission to the CO; (v) ensure that the objectives and milestones of the whole WP and of the activities within the WP are achieved on time; and (vi) ensure the deliverables are provided according to the time schedule. Further, WP leaders will report to the CO and the EDM.

Table 1: WP Leaders of ECOLOPES.

WP	Title	Leader	Email Address
WP1	Project management and coordination	Wolfgang Weisser	wolfgang.weisser@tum.de
WP2	Dissemination and exploitation	Ferdinand Ludwig	ferdinand.ludwig@tum.de
WP3	ECOLOPES Platform Architecture	Verena Vogler	verena.vogler@mcneel.com
WP4	Data acquisition and information modelling	Defne Sunguroglu Hensel	defne.hensel@tum.de
WP5	Voxel Model & Computational model	Michael Hensel	hensel@iemar.tuwien.ac.at
WP6	Computational Simulation and Analysis	Shany Barath	barathshany@technion.ac.il
WP7	Overall Validation	Katia Perini	katia.perini@unige.it
WP8	Ethics requirements	Anne Mimet	anne.mimet@tum.de

2.2 Group Responsibilities and Competencies

In what follows, the responsibilities and competencies of the three groups in ECOLOPES' organisational structure are outlined.

2.2.1 General assembly (GA)

The ECOLOPES decision-making body is the General Assembly (GA), composed of one authorised representative per partner and chaired by the CO, who also serves as the official interface between consortium and European Commission. The GA is in charge of all scientific aspects, ensuring that ECOLOPES strategic vision is implemented and developed. Decisions will be made democratically. In case of not meeting full consensus, majority decision will be

reached. The GA takes responsibility for IP related decisions, organisation of joint publications and support IP protection where appropriate, under the advice and proposal of the EDM.

2.2.2 Project management board (PMB)

The Project Management Board (PMB) meets every three months and is in charge of the overall project management through periodic follow-up meetings. It is composed by: the project CO, TUM, who oversees the overall administrative, financial, legal, contractual and ethical management of the consortium, and is supported by MCNEEL in technical as well as risk and quality management; the EDM who oversees the DEP implementation and update, including IP policies, dissemination and communication activities implementation.

2.2.3 Ethics Board (EB)

The Ethics Board (EB), presided by TUM monitors the involvement of humans in the design cases with respect to the fulfilment of ethical guidelines, and, if appropriate, suggests corrective actions. EB is constituted by representatives of TUM, TECHNION, and external experts. The EB is led by the Ethics Manager (EM). The current structure of the EB is shown in Table 2.

Table 2: Ethics board members.

Member	**Organisation**	**Email Address**
Anne Mimet (EM)	TUM	Anne.mimet@tum.de
Michael Schloter	TUM; Helmholz Munich	schloter@helmholtz-muenchen.de
Ferdinand Ludwig	TUM	ferdinand.ludwig@tum.de
Assaf Shwartz	TECHNION	shwartza@technion.ac.il
Wolfgang W. Weisser	TUM	wolfgang.weisser@tum.de

2.2.4 User Group (UG)

The external expert and non-expert user group will be defined in year 2.

2.2.5 Advisory Board (AB)

The ECOLOPES Advisory Board (AB) consists of leaders in relevant scientific fields such as ecology, human ecology, epidemiology, plant modelling, members of administrations and a leading architectural firm in sustainable design. Details on the AB representatives are provided in Table 3. The AB members are invited to attend the Kick-Off- and General Assembly Meeting in Barcelona (Table 4).

Table 3: The End User Advisory Board members.

Member	Company/ University	Field of Expertise	Short description	Relevant WP
Prof. John M. Marzluff	James W. Ridgeway- Professor of Wildlife Science	Ecology, human ecology	Prof. Marzluff studies the relationship between humans and birds to discover how best to conserve wildlife in our modern, human dominated world. Partnering with colleagues in urban	WP4, WP5, WP6, WP7

	School of Environmental and Forest Sciences University of Washington Seattle		planning, medicine, and natural resource agencies he strives to make our research relevant to policy makers, managers, and citizens.	
William Myers	Guest Curator: Science Gallery Rotterdam | MIT Museum	Architecture, Ecology, Dissemination, Biodesign	William Myers is a curator, author, and teacher based in Amsterdam. His book Biodesign (2018) identifies the emerging practice of integrating biological processes into design and architecture.	WP4, WP5, WP6, WP7
Stefania Manca	Municipality of Genoa; Urban Agenda & Green Transition Office	Urban planning, Smart cities	Stefania Manca is the Resilience Manager of the Municipality of Genoa and head of the Urban Agenda & Green Transition Office; Technical Coordinator Partnership on Adaptation to Climate Change; project leader of the Action Plan of Genoa considering the current global changes. She currently works in the Innovation, Quality and Economic Development Department of Genoa Municipality.	WP4, WP7
Dr. Timothy Beatley	Department of Urban and Environmental Planning School of Architecture University of Virginia	Urban planning	Timothy Beatley's work focuses on the subject of sustainable communities, and creative strategies by which cities and towns can fundamentally reduce their ecological footprints, while at the same time becoming more livable and equitable places.	WP4, WP5, WP6, WP7
Sophie Deramond, Angela Lee	Cartier Dalix	Architecture	The famous French practice ChartierDalix architecture is well-known for extensive greening of their buildings and for integrating biodiversity into their design.	WP3, WP4, WP5, WP6, WP7
Chiara Wolter	Project Manager - Energy and Renewables, Architect Ambiente Italia Srl Energy Department	Energy, Architecture	Architect, she is responsible for the Energy department of Ambiente Italia Group. Her main experience area refers to energy saving in residential buildings as well as in commercial and industrial plants, set-up of development scenarios for the impact of energy efficiency measures at urban and territorial level, as well as monitoring systems.	WP4, WP7
Dr. Marie Standl	Head of Research Group 'Allergic Disease Epidemiology', Head (ad interim) of	Epidemiology	Dr. Marie Standl background is in statistics with focus on statistical modelling of high dimensional data. The current research focus includes the potential role played by gene-diet interactions and health, primarily	WP4

	research group 'Lung Epidemiology', Helmholtz Zentrum München		chronic diseases during childhood, and to the influence and interplay of lifestyle (e.g., diet, physical activity), environment (e.g., greenspace and air pollution, as well as other built environment characteristics), genetic and metabolic factors.	
Dr. Isabelle Boulangeat	PhD, Chargée de recherches LESSEM (Laboratoire Ecosystèmes et Sociétés en Montagne) INRAE Lyon-Grenoble	Ecology, Plant modelling	Her research aims to understand the dynamics of socio-ecosystems, from a theoretical viewpoint to conservation issues in alpine ecosystems. She seaks to improve biodiversity models of species distributions and community dynamics in mountain ecosystems, without neglecting the interactions with the society. She is the creator of the FateHD model, used for modelling plant dynamics in this project.	WP3, WP4
Dr. Cédric Pruski	Senior Researcher ITIS Department Luxembourg Institute of Science and Technology (LIST)	Ontologies	Cédric Pruski's research interests are Artificial Intelligence and knowledge representation and reasoning. He successfully coordinated national and international research projects that have generated many publications in major conferences and peer-reviewed journals of the field Artificial Intelligence and knowledge representation.	WP3, WP4

3 COMMUNICATION PROCEDURES AND REPORTING

This section contains the description of the communication between partners of the consortium, and the reporting documentation format.

3.1 Communication Procedures

The communication between the partners of the consortium takes place on a daily basis (mainly via email) and at meetings arranged for this purpose. The communication platform used for in ECOLOPES is the Microsoft Teams platform. The platform is used to organise meetings, keep track of the project deadlines, attribute tasks, have more or less formal chats between the members of the consortium, share data, and work on shared documents.

3.1.1 General communication between partners of the Consortium

The CO will be responsible for the management of communication within the Consortium. The main communication means between participants should be, but not limited to, email, the Teams platform and on-line voice- and chat-programs. For the delivery of on-paper documentation, emailing of scanned copies should be preferred over fax (due to usually better quality of the former). For the delivery of administrative documentation, postal services should be used.

The majority of the day-to-day information (both administrative and technical) will be transferred electronically by e-mail. However, in order to reduce the volume of e-mails and ensure a continuous availability of electronic documentation, the Project will maintain a secure repository of all project documents and deliverables on a Communication Server at TUM. Instead of circulating project documentation (including deliverables) to the partners by email,

the responsible partner will upload it to the Server and inform the partners of their availability for shared editing. In the case of evolving documentation worked on by several partners, the subsequent versions of the documentation will equally be kept (and adequately managed in order to avoid confusion) on the Server in the common repository.

One document repository has been installed to ensure the exchange of document material in the project. It is based on the Microsoft Teams platform: https://teams.microsoft.com/_#/conversations/General?threadId=19:1a16e46b923b4ba0bde54041a6d49407@thread.tacv2&ctx=channel. TUM has supplied each authorised user with a username and password. Section 3.2.1 contains a thorough presentation of Teams.

Each partner is responsible for uploading their material intended to share with either some or all other partners of the Consortium into one of the repositories. Which of the repositories is to be used depends on the volume of the data to be uploaded.

In addition to the document material repositories, a private GitHub and GitLab code repositories were created by TUM. Certain branches of the code will have the capability to become public so as to enhance the project's visibility and help research community to conduct experiments in relevant research domains. MCNEEL will provide a source code repository and an issue tracking system for development interaction. Each developer in ECOLOPES will have received a login account and ensured that the repository is fully accessible.

3.1.2 Meetings

All participants will be reminded of project meeting dates at least 30 days in advance and the Meeting Chair will circulate a draft of the agenda no later than two weeks before the meeting for comments and possible adjustments. For the plenary meetings of the Consortium, the Meeting Chair will be the CO; for the WP meetings, the Meeting Chair will be the WP leader or the responsible for the task to be addressed at the meeting. All necessary working documents will be uploaded on the wiki at least five working days in advance of the meeting date. This applies in particular to plenary meetings of the Consortium.

Draft minutes will be sent to the Partners no later than 10 days after the meeting. The Partners will review them and, if necessary, suggest corrections. The minutes, on which all partners agree, are to be approved and the final version will be kept in the wiki. Prior to the following meeting, the minutes shall be deemed as approved if no objection has been sent to the CO within 15 days after the circulation of the minutes.

Since the beginning of the project, a kick-off and a General Assembly meetings (hybrid in Barcelona) were held, and another General Assembly meeting is planned for the period M12 to 14 of the project (Table 4).

Table 4: Meetings.

Type of meeting	Participants	Host	Venue	Date	Project Month
Kick-off meeting	Consortium and Advisory Board members	TUM	Online meeting hosted on the Zoom platform.	12.–13.04.2021	M1
1st General Assembly meeting	Consortium and Advisory Board members	MCNEEL	Hybrid meeting held in Barcelona.	30.11.–02.12.2021	M8/ M9

Further, a number of regular meetings structure the interactions in ECOLOPES to insure sufficient communication at every step of the process:

- ***The General assembly meeting:*** The meeting occurs every year. It involves all the members of the consortium and the advisory board. It aims to present the current state of the project, identify emergent problematics and solutions, and get feedbacks and recommendations from the advisory board.
- ***The Project management board meeting:*** It occurs every 3 months to insure the overall management of the project.
- ***ECOLOPES monthly meeting:*** It reports the progress done within each WP in the past month and brings forward important questions to be addressed by the consortium.
- ***The Individual WP meetings:*** They occur at the frequency fixed by each WP leader according to the WP needs. WPs meetings are opened to all members of the consortium, but certain WPs/members can be more specifically asked to join to contribute on given topics. **WP1** (Project management and coordination) meets monthly. **WP2** (Dissemination and exploitation) meets weekly. **WP3** (Platform Architecture) meets every two weeks and requires the participation of WP4, WP5, WP6, and WP7. **WP4** (Data acquisition and information modelling) meets as a large group every month. The modelling team of WP4 meets every two weeks. **WP5** (ECOLOPES Voxel Model & Computational model) meets weekly. **WP6** (Computational Simulation and Analysis) meets weekly. **WP7** (Overall Validation) has not formally started yet.

3.1.3 Mailing lists

There are 5 mailing lists in the ECOLOPES project:

- One mailing list for the entire consortium
- One mailing list for each work package
- One mailing list for the General Assembly
- One mailing list for the Project management board
- One mailing list for the Advisory board

3.2 Information management

3.2.1 Collaborative tool

The Teams platform is a standards-compliant, simple to use tool, mainly aimed at creating documentation of any kind.

Teams serves the ECOLOPES management procedures and partners collaboration and allows not only file and document uploading and sharing, but also creation and editing of living documents that are documents that can be accessed and edited simultaneously from multiple users.

In Teams there is information about project administrative issues such as contract documents, effort tables, management entities and boards, contact, meetings, WP, etc. Furthermore, the project reporting (Section 3.3) is performed through Teams.

Besides the administrative and managerial part, Teams is also used for the actual project work. There are Groups for every WP. In each WP Group there are informative files containing the WP tasks, the effort allocation and the deliverables. There are also parts such as WP and task planning for the forthcoming period and open issues and action points, in which the work that should be performed and the possible issues that should be taken into account are described.

Through the Teams tool, any consortium member can create very easily a new sub-page and any other member can edit, comment or add content to it.

Finally, publication and dissemination activities as well as meeting information (presentations, minutes) are also stored in the wiki tool. The collaborative tool is administrated by Anne Mimet (ge37kev@mytum.de) and all the partners are supplied with a username and password in order to access the wiki.

3.2.2 Document templates

In order to achieve uniformity in the presentation of ECOLOPES deliverables, internal documents and presentations, TUM has provided separate templates for each type of document. The following templates are available:

- Template for deliverables in MS Word (.docx)
- Template for presentations in MS Powerpoint (.pptx)
- Template for meeting agenda and minutes in MS Word (.docx)

3.2.3 File naming and numbering

All created files are uploaded to Teams. Although they will be linked to Teams, it is useful to follow rules regarding their naming. This way locating a document is much easier since its content can be identified directly from the file name without having to download and open them. Thus, each of the documents mentioned in the section “Document Templates” follows a specific naming convention that consists of specific fields describing their attributes:

Deliverables naming:

- Deliverable naming: number>_ECOLOPES_<deliverable title>_<Date(YYYYMMdd)>_<version>. An example is “D1.2_Ecolopes_PreliminaryProjectManagementQualityAssurancePlan_20211215_v0.2.docx”
- Presentations naming: <Workpackage number>_ ECOLOPES_<Venue>_<Date(YYYYMMdd)>_<version>. An example is “WP4_ ECOLOPES_ kickoff_20210412_v0.1.pptx”
- Meeting minutes naming: ECOLOPES_Minutes_<Venue>_<Date(YYYYMMdd)>_<version>. An example is “ECOLOPES _Minutes_kickoff_20210412_v0.1.docx”

Finally, in order to avoid mailboxes overload, the documents are not distributed via email but are uploaded instead to Teams and then the list (or the related partners) can be notified via email (including the URL of the uploaded document).

3.2.4 Actions, meeting minutes and open issues logging

Actions and open issues logging are very important procedures and their continuous update is significant. For that reason, there is a separate section containing the action points and their deadlines of all WP for action and open documentation. It is very important for the WP leaders to update this section as frequently as it is needed and to complete them on time.

After the Consortium meetings, minutes from all sessions are recorded in the suitable “Meeting minutes” template format (see subsection “Document templates”) and uploaded in Teams under the subsection “Meetings”.

3.3 Reporting guidelines

The following types of reports will be used to monitor the progress of the project and the compliance with all contractual obligations: (i) internal biannual reports; (ii) cost statements; (iii) deliverables; (iv) and the final report.

3.3.1 Cost statements

The time-cycle for the preparation of the Cost Statements reflects, first, the contractual requirement that complete Cost statements must be delivered to the European Commission within two months after the end of the reporting period; and second, Cost statements are likely to involve the provision of Audit Certificates by some partners.

The Cost statement templates are accessible through Teams. They have to be filled out by each partner within three weeks after the end of the last month of the reporting period, together with any additional justifications required by the contract. The CO will verify the provided information, consulting, if necessary, with each partner individually in order to reach a confirmed version within one month after the end of the reporting period. Partners requiring Audit Certificates will then procure the necessary certificate from an independent professional auditor.

Once the draft Cost statements have been verified and deemed correct and complete; they will be submitted through the Participant Portal by the CO.

In case any of the partners fails to respect the deadlines, the CO will submit the cumulative Cost statements on time, without the data concerning the partner who missed the deadlines. This procedure will ensure that no delays in payment of the other partners occur. The costs not reported in a Cost statement due to missed deadlines will be included in the next Cost statement.

3.3.2 Deliverables

As Coordinator partner, TUM has the administrative responsibility for the transmission of all deliverables to the Commission. In the case of deliverables for which TUM is not in charge of their preparation, the responsible partner will supply an electronic copy of the Deliverable to TUM for verification 7 working days in advance of the submission deadline.

The process for approval and the quality control procedures for all technical deliverables (except for management reporting deliverables) will be as follows:

- Partners responsible for deliverable, both the deliverable coordinator (DC) and contributors, are already defined in the DoA document for the ECOLOPES project
- The DC and contributors will agree upon the Table of Content (ToC)
- The DC and contributors will agree upon the tasks each contributor will address
- The DC and contributors will agree upon a provisional calendar
- The DC together with the RQAM and the CO will identify a suitable technical expert (within the partner group but not directly implicated in the deliverable) who will conduct a formal internal peer review with a short report as soon as the deliverable is finished
- The contributions will be made by contributors (deadlines being under the responsibility of DC and Contributors) with respect to the provisional calendar
- The integration of the several contributions is made under the responsibility of the DC
- A distribution of the draft version is done to contributors for agreement
- Then, it is distributed to all Consortium members and to the reviewers (at least 2 weeks before the deadline)
- The DC will integrate the different requested remarks/revisions provided by the reviewers; the reviewer comments the deliverable directly in the text
- The DC will distribute the revised deliverable to all contributors for their final agreement (at least 3 days before the deadline)
- The CO will have the responsibility to send the electronic version to the EC Project Officer; all partners are subsequently informed

In the case of deliverables that span over several working fields, internal reviewers may be appointed to each chapter or section of the deliverable. After the review process, the CO is responsible for the submission of the final version of the deliverable to the Commission.

3.3.3 The final report

The content and conditions of the final report will be decided in the year 3.

4 4. ENSURING HIGH QUALITY RESEARCH AND DEVELOPMENT

In order to achieve the objectives outlined in the Work Plan, both high quality research and professional SW development must be ensured.

4.1 4.1 Ensuring high quality research

In order to ensure high-quality research, ECOLOPES will take the following specific steps:

- publish the work performed in the project in high-quality journals and conferences
- deliver high-quality deliverables, i.e., reports and prototypes
- define performance indicators and monitor the progress of the objectives according to them
- apply self-assessment techniques for producing quality software

Regarding journal and conferences, ECOLOPES partners will publish their work in scientific journals and present them at conferences that are related to their area of expertise. Publishing guidelines are being developed and will be presented in the final version (D1.7).

4.2 Ensuring high quality software development

High quality SW development in ECOLOPES will be enforced by applying methodologies and controls both at the process level (methodology for the development cycles) and at the product level (the software artefacts and SW demonstrators of the project).

4.2.1 Software development methodology

ECOLOPES is a cross-disciplinary and multi-team distributed project. As such, teams will be self-organised in the context of a larger, global vision and planning driving the project and coordinating the efforts. The development team integrates their work frequently, helping to identify problems early and to validate latest changes in the integration with the rest of the application. Automation tools are used to automate the integration process between the different development teams, building and deployment a software release. Through Continuous integration first, projects get systematic code integration activities and predefined quality measurement; secondly, no regression errors will appear during the development phase; and ultimately, any changes in development can be tracked, deployed to the integration server and the previously defined and automated functional tests are triggered. The system integration partner in ECOLOPES, MCNEEL, will make a suggestion which methodology shall be used in the project. This methodology will automate code integration, including build processes and validation tests, in order to detect integration errors as quickly as possible, reducing errors, anticipating trouble-shooting and speeding software development process. This suggestion will require an approval by the PMB and GA. However, the methodology that is going to be followed in ECOLOPES for implementing development is going to be decided and will presented in the final version of the Risk and Quality Assurance Plan (D1.7). Currently, the feasibility of common software development methodologies such as the Waterfall methodology and SCRUM, and their applicability to ECOLOPES are being evaluated.

4.2.2 Software evaluation Plan

Continuous integration is a software development practice, in which members of MCNEEL will also apply other techniques to assure the quality of the software:

- Tools to perform static code analysis (PMD, CheckStyle, FindBugs, Sonar) in order to manage code quality, identify potential bugs; detect bad practices in code development, and other frequent quality problems.
- Coding standards, guidelines and checklists, which define quality standards and metrics to be followed during the project execution in order to guarantee that the final product meets the specified requirements.
- Version Control to provide fully auditable source code, recording all changes historically and enabling restoring to any given snapshot in time.

Following the continuous integration principles, an initial barebones prototype will be assembled and deployed early in the project, and built incrementally by partners. Continuous integration will ensure that the prototype is kept operational, and no regressions occur.

5 PROCEDURES FOR RISK ASSESSMENT AND CONTINGENCY STRATEGIES

This section deals with identification and management of risks as well as with the procedure and the measures taken towards addressing non-conformity and quality flaws.

5.1 Risk Assessment

Risks are events that, when triggered, cause problems. Risk sources may be internal or external to the system that is the target of risk management. For instance: a source can exist in the activities of a given WP and can generate a risk in another WP in which the risk will be managed. In that case, the risk source can be considered as external.

The identification of risks is ensured through self-assessment and originates from a “top-down” or “bottom up” approach: in the “top-down” approach, the CO will check the potential risks during each General assembly meeting and conference call; in the “bottom-up” approach, each project member can notify a risk during WP meetings, which will be collected by the WP leader who will inform the CO.

The probability of occurrence of the risk and the probability of the risk to occur need to be assessed. Thus, risks need to be quantified in two dimensions (L and S, Table 5). The larger the number is, the larger the impact is. By using a matrix, a priority can be established. Once the risk is clearly identified and assessed, the relevant mitigation strategy will be determined during a GA meeting.

Table 5: Identified risks, description and mitigation measures for ECOLOPES (L = Level of risk; S = Severity of risk; scale from 1 to 10).

WP	Risk description	L	S	LxS	Mitigation measures
2	Failure on disseminating the outcome and exploitation of the project	4	8	32	Target groups and potential stakeholders will be contacted early in the project through various communication activities to raise timely interest in the scientific and technological outcome of the project

2	Failure on exploiting the outcome of the project	3	6	18	The highly acclaimed industrial partners (McNeel), universities (TUM, UNIGE) and SAAD ensure that will create a promising field for the exploitation of the project's outcome
4	Ontology overly complex	7	8	56	Start with simple relationships among inhabitants and low complexity (e.g., few PFT), compare predictions of more complex model with simpler ones, conduct model simplification
5,6	Poor integration of different computational tools	5	8	40	Common platform, gradual build-up of tools based on the extensive experience of VIE, TECH and partners
3,7	Partners cannot reach consensus regarding scenarios architecture	4	7	28	ECOLOPES partners have already outlined specific use case scenarios and are seeking to extend them to wider sets as possible. The consortium includes all necessary expertise to identify ECOLOPES architecture requirements
3	Front end tool not ready to be adopted by end users	3	7	21	Though ECOLOPES tools will be immediately useful for the AEC professional community and academic research, we will also further develop and fine-tune them via follow-up projects of higher TRL.

5.2 Corrective action procedure

This section describes the procedure for corrective actions beginning with its scope and describing the steps in detail.

5.2.1 Scope

The scope applies to all items including software and documents belonging to the ECOLOPES project. Any non-conformity must be managed according to the directives defined by this procedure.

5.2.2 Procedure

The procedure covers the series of steps taken to accomplish the correction of any non-conformity of ECOLOPES results including software and documents. Therefore, the final version of the Risk and Quality Management Plan (D1.7, M36) will document the problems detected, identify the steps necessary for resolving the issues, and finally, will present the resolution of the problems. It includes a detailed description of corrective action procedures starting from the detection up to the implementation or rejection of the corresponding corrective action that could be triggered.

6 RESEARCH AND PERFORMANCE INDICATORS

This section describes and summarises the research and performance indicators for each research activity (per WP). In addition to the listed activity-specific research indicators, the success of each activity will be also measured in terms of the number of publications in first-tier conferences and journals of the respective field. The indicators will be further detailed as proved to be appropriate in D1.7 (M36).

6.1 Indicators WP1

WP1 deals with all coordination and management aspects of the project including project coordination, communication with EC and reporting, risk management and ICT management, and the elaboration and maintenance of the DMP and DEP.

Table 6: Research and performance indicators for WP1.

Administrative activity	Performance indicators
Ensure attainment of goals and delivery of project deliverables and milestones	• Deliverables following the guidelines as defined in the present Risk and Quality insurance plan • Submission of deliverables in time • Verification of cost statements and financial claims
Ensure legal standards for data handling throughout the whole project	• Production of a Data Management Plan (D1.1) • Production of the databases as described in the Data Management Plan • Application of the guidelines defined in the Data Management Plan
Risk and quality insurance	• Production of a Risk and Quality insurance plan (present deliverable) with guidelines to be followed during the project • Implementation of a meeting schedule optimizing communication

6.2 Indicators WP2

WP2 addresses the engagement activities towards our Stakeholder Networks (SNs), incl. actors in the AEC sector and the policy/regulatory framework. It includes disseminating and communicating the project results - especially the EIM Ontology and simulation platform, and outcomes of the validation activities - through different communication channels incl. peer-reviewed publications, articles in technical journals, conference presentations, social media post success stories, organization of workshops and seminars, content production downloadable from our project website, as will be described in our DEP.

Table 7: Research and performance indicators for WP2.

Dissemination and Exploitation activity	Performance indicators
Scientific publication	• Number of papers in peer reviewed journals • Number of conference papers • Number of reads and citations of publications • Impact factor and cite score of journals

Social Media	• Number of posts on Facebook, Instagram and Twitter • Number of followers (Facebook, Instagram, LinkedIn, Researchgate)
Website and Blog	• Number of blog articles on website • Number of website updates/news • Number of newsletter subscribers
Press and Media	• Number of press releases • Number of articles written about the project in newspapers, magazines, blogs etc. • Number of TV features • Spread and reputation of the respective medium
Patents	• Number of patents • Number of design patents • Number of utility models

6.3 Indicators WP3

WP3 creates the ECOLOPES computational platform including data warehousing capabilities, as a basis for integrating the components from WP4-5, thus enabling modelling in WP6-7. WP3 develops and connects two front-end tools to a) visualise simulated output of the ontology, b) apply it to a building.

Table 8: Software (SW) development and performance indicators for WP3.

SW development activity	SW development indicators	Performance indicators
Collection of technical requirements for the platform development.	• Definition of data inputs and outputs for each software component (different development teams), data standards in the project, size of datasets and processing requirements to build a cloud-based infrastructure for the ECOLOPES platform.	• Agreement on a common computational workflow for the ECOLOPES technology • Efficiency
Development of the ECOLOPES platform and the integration of software components from other development teams	• Cloud-based platform development through continuous integration: • Projects get systematic code integration activities and predefined quality measurement; • No regression errors will appear during the development phase; • Any changes in development can be tracked, deployed to the integration server and the previously defined and	• Testing and evaluation of the cloud-based ECOLOPES platform (the sandbox, which is a preliminary version of the ECOLOPES platform and testbed for the ECOLOPES cross-disciplinary development team). • Accessibility • Usability • Efficiency

	automated functional tests are triggered. • Separation of a Cloud Storage, Cloud Processing, and cloud-based Production Environment.	
Collection of user and technical requirements for the front-end tool development.	• Definition of user-requirements for the development of a toolset that suits the users' needs. All stakeholders are involved in this process (Questionnaires) • Translation of user requirements into technical requirements for tool development.	• Check if technical requirements meet the user requirements (quality control). • Check until which level the technical requirements are considered in the tool development (SW evaluation).
Front-end tool development based on the open SDK of the standard CAD environment (Rhino, McNeel).	• Code following good practice (see WP3, D1.1 Data Management Plan) • Static code analysis (PMD, CheckStyle, FindBugs, Sonar) in order to manage code quality, identify potential bugs; detect bad practices in code development, and other frequent quality problems. • Coding standards, guidelines and checklists, which define quality standards and metrics to be followed during the project execution in order to guarantee that the final product meets the specified requirements.	• Testing and evaluation of the tools by expert- and non-expert end-users. • Version control to provide fully auditable source code, recording all changes historically and enabling restoring to any given snapshot in time. • Accessibility • Usability • Efficiency
SW Training	• Provision of software training related to the functionality of the cloud-based 1st prototype of the ECOLOPES platform, trainings for Visual Programming in Grasshopper, and parametric environmental analysis bridging external expert software such as EnviMet of ClimateStudio for environmental analysis with Grasshopper. • Training courses and 1:1 development bi-weekly training sessions.	• Participant feedback and trained cross-disciplinary team members.

6.4 Indicators WP4

WP4 will develop the EIM Ontology (D4.1) that integrates architecture with abiotic environment, soil/substrate, and requirements, impacts and dynamics of plants, animals and microbiota. WP4 will model relationships of each component of the *ecolope* ecosystem with the other components, building on existing data bases and experiments to feed the ECOLOPES database. The ontology will be tailored for decision support and reasoned to capture design instructions to inform an algorithmic design process.

Table 9: Research and performance indicators for WP4.

Research activity	Research indicators	Performance indicators
1. Urban Classification	• Publication • Produced spatial data set • Code following good practice (see D1.1 Data management plan)	• Validation of reliability by the case study sites • Spatial coverage • Evaluation of the input data set according to modelling and decision support needs • Uncertainty evaluation
2. Soil-Microbiota model	• Collection of existing published data for model calibration and validation • Critical review on existing data and discussion of the need for additional data • Collection of experimental data for model calibration and validation • Collection of data from study sites • Case study publication • Model publication integrating abiotic and biotic soil properties • Soil classification publication • Code following good practice (see D1.1 Data management plan)	• Uncertainty evaluation • Model validation based on existing data (precision and reliability) • Compliance with other soil classifications and standards
3. Plant model	• Collection of experimental data for model calibration and validation • Collection of existing published data for model calibration and validation • Collection of data from study sites • Model publication • Publication of the Plant Functional Groups classification • Code following good practice (see D1.1 Data management plan)	• Uncertainty evaluation • Model validation based on existing data (precision and reliability) • Validation of the Plant Functional Groups
4. Animal model	• Collection of existing published data for model calibration and validation • Collection of data from study sites	• Uncertainty evaluation • Model validation based on existing data (precision and reliability)

	• Model publication • Publication of the Animal Functional Groups classification • Code following good practice (see D1.1 Data management plan) •	• Validation of the Animal Functional Groups
5. Ecological Model	• Definition of interfaces between individual models • Publication • Code following good practice (see D1.1 Data management plan)	• Uncertainty evaluation • Interoperability between the sub-models • Interoperability and data integration with the ontology
6.Human Response	• Collection of experimental data for evaluation of human well-being • Collection of experimental data for evaluation of animal likability • Publication	• Social-economical and spatial coverage, and number of participants entering the study
7.Expert Database	• Public database	• Response time between database and ecological model • Speed of data retrieval • Ability to represent octrees and multi-dimensional arrays • Interoperability with the ontology • Compliance with data standards
8.EIM Ontology	• Publication • Ontology in Protégé	• Precision and Recall • Case-study based evaluation and validation • Compliance with FAIR data principles • Interoperability and data integration

6.5 Indicators WP5

WP5 has three key objectives: 1) development of a Voxel model that integrates, spatializes and visualises ecological and architectural data, and links the EIM Ontology from WP4 with the computational model; 2) development and integration of algorithmic processes and tools in Rhino3D and VR; 3) validation of algorithmic processes and tools that deliver the basis for the work in WP6 and WP7.

Table 10: Research and performance indicators for WP5.

Research activity	Research indicators	Performance indicators
Voxel model	• Publication • Code following good practice (see D1.1 Data management plan)	• Data integration and correlation • Communication with EIM Ontology

		• Communication with CAD model
Algorithmic generative design process, and tools	• Publication • Code following good practice (see D1.1 Data management plan)	• Variety generation (expansion of solution space) • Design outcome ranking and variety reduction • Communication with EIM Ontology • Communication with voxel model
Validation of algorithmic process and tools	• Publication • Code following good practice (see D1.1 Data management plan)	• Process: validity of variety generation and reduction • Tools: validity of design outcomes comparing design goals and design outcomes

6.6 Indicators WP6

WP6 will develop the data-integrated computational model (WP5) into computational simulation environment by: 1) computational simulations, multi-criteria analysis and rating strategies that enable decision making processes for the selection of ECOLOPE design cases; 2) validating the computational workflow to ensure integration and interoperability through design cases in preparation of design validation (WP7).

Table 11: Research and performance indicators for WP6.

Research activity	Research indicators	Performance indicators
Design iteration optimisation	• *Ecolope* design alternatives based on design objectives and key performance indicator (KPI) trade-offs • Design approach for modelling optimisation of the *ecolope* • Publication	• Validation of design optimization outcomes in relation to design objectives (Precision and Reliability) • Validation of interoperability with EIM Ontology, Voxel Model, Ecological Models, and ECOLOPES Database
Multi-criteria evaluation	• Architectural and Ecological Key Performance Indicators (KPIs) • Multi-criteria rating strategy to evaluate and measure the optimised design cases • KPI hierarchy and prioritisation • Publication	• Evaluation of KPIs and hierarchy through expert knowledge • Design outcome ranking and variety reduction • Response time for evaluation • Validation of interoperability with EIM Ontology, Voxel Model, Ecological Models, and ECOLOPES Database

Multi-criteria simulation	• Multi-criteria simulation strategy to enable an iterative process • Optimized architectural and ecological KPIs • List of trade-offs values between the inhabitants and the *ecolope* • Publication	• Validation of simulation outcomes for specific design cases (reliability and precision) • Accuracy and reliability of trade-off values • Response time for simulation • Validation of interoperability with EIM Ontology, Voxel Model, Ecological Models, and ECOLOPES Database

6.7 Indicators WP7

Objectives: WP7 will demonstrate the effectiveness of ECOLOPES multispecies design and of the ECOLOPES design platform developed across WP3–WP6. The design process will be validated through specific design cases for selected sites to determine whether adequate outcomes for inhabitants are obtained and if the ECOLOPES design platform is adequately integrated. WP7 will provide feedback for optimisation.

Table 12: Research and performance indicators for WP7.

Activity	Research indicators	Performance indicators
1. Human comfort validation	• Publication • Collection of existing data for human thermal comfort assessment • Methodology for human thermal comfort validation	• Validation of design outcomes for specific design cases in terms of human comfort (precision and reliability)
2. Human wellbeing	• Publication • Collection of existing data for human wellbeing assessment • Methodology for human wellbeing validation	• Validation of design outcomes for specific design cases in terms of human wellbeing (precision and reliability) • Social-economical and spatial coverage, and number of participants entering the study
3. Building blocks (BB)	• Publication • Production and exposure of BB in 4 cities/countries • Collection of data from study sites	• Precision and completeness of BB production • Validation in term of compliance with modelling and simulations
4. Overall validation	• Definition of indicators of success • Identification of the best design outcomes • Feedback for optimization	• Validation of design outcomes • Number of experts involved

6.8 SUMMARY

In this deliverable the risk and quality assurance measures and guidelines, which will be followed during the project in terms of a Risk and Quality Assurance Plan (RQAP) are presented. The RQAP covers quality relevant aspects of the project's organisation structure. In particular, a hierarchical organisational structure is defined and risk and quality assurance roles and responsibilities are assigned among the consortium members. Then, the RQAP describes the communication procedures within the consortium as well as the procedures for the efficient production of reports and deliverables. Further, it outlines the methodologies and controls that will be applied to ensure both the high-quality research and SW development. Procedures for the identification and management of risks as well as the measures taken towards addressing non-conformity and quality flaws are also defined with the identification of risks to be triggered by the CO or each project member. Lastly, the RQAP provides a refined list of indicators per WP that will be used to evaluate the progress of each research and SW development activity.

7 APPENDIX

7.1 Appendix I: ECOLOPES Logo

7.2 Appendix II: ECOLOPES Templates

- Template for deliverables in MS Word (.docx): Template_ECOLOPES_deliverables.docx
- Template for presentations in MS Powerpoint (.pptx): Template_ECOLOPES_Presentations.pptx
- Template for meeting agenda and minutes in MS Word (.docx): Template_ECOLOPES_Meetings_Agenda_and_Protocol.docx

ECOLOPES

ECOlogical building enveLOPES: a game-changing design approach for regenerative urban ecosystems

H2020-FET-OPEN-2021-2025

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Abstract

Few lines (4 to 10) that describe the objectives of the deliverable.

co-funded by the European Union

HISTORY

Version	Date	Reason	Revised by

AUTHOR LIST

Organization	Name	Contact Information

EXECUTIVE SUMMARY

Abbreviations and Acronyms

Table of Contents

1 INTRODUCTION

The text should be written in Calibri 12 font.

2 SECTION 2

2.1 Part 1

Paragraph 1

Table ex: Table caption

WP	Title	Leader	Email Address

REFERENCES

References are given in the format of the journal Ecology.

Examples:

Birkhofer, K., Smith, H. G., Weisser, W. W., Wolters, V., & Gossner, M. M. (2015). Land-use effects on the functional distinctness of arthropod communities. *Ecography*, *38*(9), 889–900. https://doi.org/10.1111/ecog.01141

Simons, N. K., Weisser, W. W., Gossner, M. M., & Gossner, M. M. (2016). Multi- taxa approach shows consistent shifts in arthropod functional traits along grassland land-use intensity gradient. *Ecology*, *97*(3), 754–764. https://doi.org/10.1890/15-0616.1

Weisser, W. W., Roscher, C., Meyer, S. T., Ebeling, A., Luo, G., Allan, E., Beßler, H., Barnard, R. L., Buchmann, N., Buscot, F., Engels, C., Fischer, C., Fischer, M., Gessler, A., Gleixner, G., Halle, S., Hildebrandt, A., Hillebrand, H., de Kroon, H., … Eisenhauer, N. (2017). Biodiversity effects on ecosystem functioning in a 15-year grassland experiment: Patterns, mechanisms, and open questions. *Basic and Applied Ecology*, *23*, 1–73. https://doi.org/10.1016/j.baae.2017.06.002

APPENDIX

Title

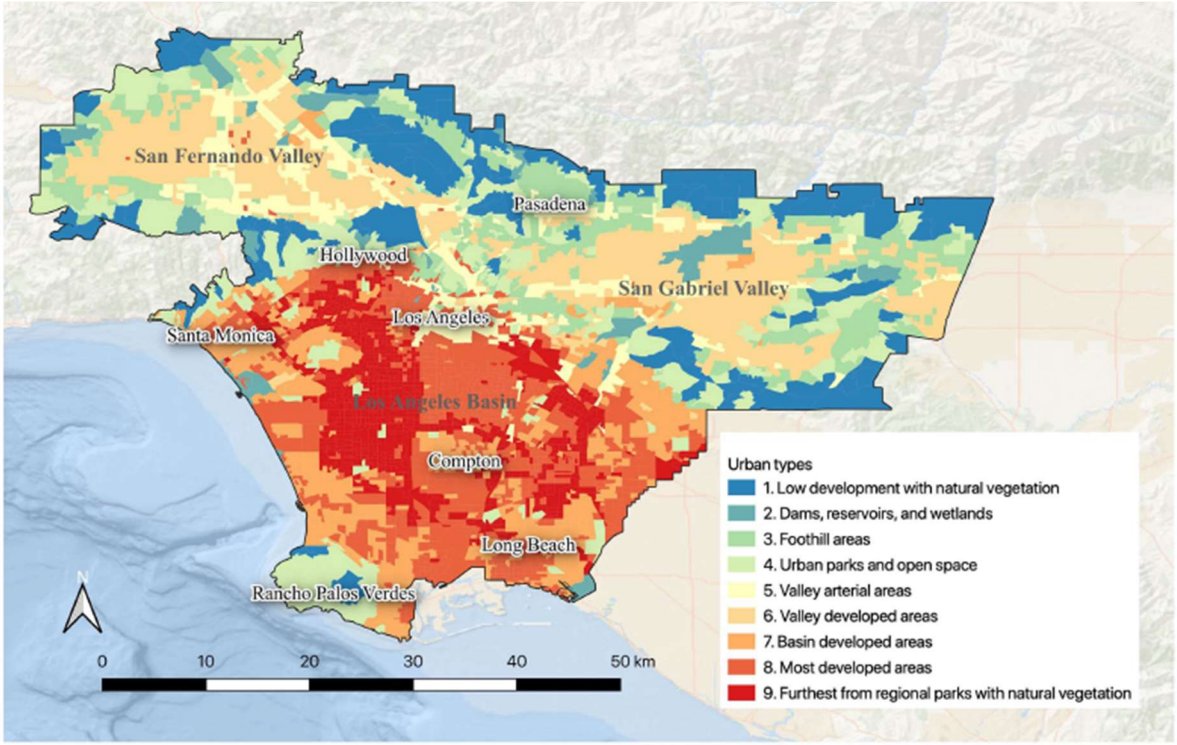
Place, data

Authors, WPs

Slide title

Subtitle

Content



Li et al., 2019. An urban biodiversity assessment framework that combines an urban habitat classification scheme and citizen science data. Frontiers in Ecology and Evolution. Volume 7.

Conclusion

- Idea 1
- Idea 2

Meeting title, including the frequency

This page contains all meeting agendas and protocols for this series of ECOLOPES meeting
(text added to the agenda as protocol after the meeting)

The last meetings appear first in the document

Topics for the next meeting

(to be completed by any member of the consortium allowed to contribute)

- Topic 1
- Topic 2

Agenda of the next meeting (to be created at least a week before the meeting according the points listed above)

Date of the last meeting

Protocol of the last meeting

List of participants

To dos

Protocol (following the structure of the last meeting agenda)

Date of the meeting before

List of participants

To dos

Protocol

Etc…