

# Urban Nature Fabrication: a framework for a practice-based teaching methodology of design for the Pluriverse

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In this paper, we present and discuss a teaching experience whose brief is to reflect and act for human-nature reconnection. It represents a novel direction within an established design curriculum and aims to introduce a consistent practice of a decolonised, anti-consumerist approach to design in the learning environment. The paper will expose the rationale of using Nature as a subject of study and highlight some research directions for a design that may contribute to new forms and methodology of practice that can offer a fresh outlook to the sustainability challenges by aiming for ecological awareness.

**Keywords:** *urban nature, Pluriverse, multispecies, fabrication*

## 1 Introduction

By definition, design is an anthropocentric discipline: providing consumables, supporting industries, building personal and collective lifestyles. The very connection with the industrial system and its consequent market distribution has made it the discipline supporting modern society in its quest towards development and connecting technology and innovation to the benefits of many. In the anthropocentric view, human wellbeing is considered the goal of technological innovation and economic science. This comes with an intrinsic contradiction: that design may have supported, more or less consciously, the consolidation of a consumerist society throughout the idea of globalised development, and the consequent environmental challenges we are facing.

Yet, despite the crisis, the paradigm by which “wellbeing and human development will be achieved as long as more and more products are designed and consumed, and as long as our technological arsenal is renewed” is still strong (Acosta, G. G., 2010).

Discussing design beyond its anthropocentric boundaries means to agree with Acosta that the design society “has come to the nonsense of believing in consumption as the obvious and logical way of solving our wellbeing as a species. This is the ideological core of the current paradigm (...)”. It seems that the ultimate challenge for creative disciplines is therefore to reconfigure a space of relevance elsewhere, outside the anthropocentric sphere, and to produce a shift towards alternative modes. We explicitly talk about critical alternatives to consumerism since talking about sustainability does not carry the value of alternatives in itself. Much of creative energy is nowadays directed towards creating forms and means for sustainable consumption: approaches such as “green”, “sustainable”, “circular” design, they “rescue human values over commercial exploitation (...) yet they follow in one way or another the paradigm where human being is the centre of everything, and because it is at the centre, it is stimulated to be responsible and support economic and financial structure of consumerism” (Acosta, G. G., 2010). Indeed, after many decades of designing for sustainability, we still lack ecological engagement, which would be the real alternative to the system of consumption. In many countries, regardless of emerging or established economies, we are still looking at the market as the driving force: producing products, services, experiences to sell, consume and dispose of—one after the other.

## 2 The relational paradigm

The roots of design discipline - traditionally ascribed at Bauhaus and Ulm schools - are visible in many worldwide institutions, and historically have been the crafted and manufactured support to emerging large scale economies. This entanglement between the modes of design as we know it and the industrial system that it serves has been dominant also in education: less than a decade ago Professor Friedman published an article about the “future of design education” (Friedman, K., 2012), still arguing its role of “preparing designers for their economic and professional role”, and grounding its paper on details of economical and political analysis. In the past two decades we have been most likely educated around and about a methodology of design thinking, able to act in a problem space, to understand users needs and provide solutions, and impact positively on the system by increasing economical, social and technical viability and desirability.

Design thinking as a design framework and HCD as a set of methodology have been built around the notion of wicked problems offered by Rittel and Webber (1973), and later from Buchanan (1992), “problems which lack clarity in both their definition and solutions”; the definition refers to complexity, since such problems present an entanglement among different challenges. Nevertheless, they fully operate within an anthropocentric paradigm, where human being is the referent and its well being is the judge of whether or not problems have been addressed successfully. In the last decades, the epistemology of complexity (acknowledging that society, earth, and life are systems) coexisted with the ontology of anthropocentrism (the development of society, earth, and life, as proxy to human benefits and development). In the words of decolonial philosopher De Sousa (2007) such ontology derives from a form of “abyssal thinking”, a framework which creates dichotomies where “something exists and something does not”, “something is possible and something else is not”; whatever the distinction may be made of, the abyssal thinking is characterized by the impossibility of co-presence of the two sides of the line. This concept is useful to focus on the limitation and inadequacy of anthropocentric perspective when looking into complexity: at the very root of the established intellectual framework, we have been living until now in a world of facts and ideas where there is “us” and “something else”. We are able to acknowledge and operate within complexity but in a univocal polarized mode where - being at the centre - we ultimately conclude on a separation between us and “the otherness”, between culture and nature. This separation is a pillar of Western thought, and it does not find correspondence in many other knowledge systems. As people do not see themselves as part of nature, nature is something to be controlled and exploited; this may explain well the conditions for the environmental devastation that we created.

The teaching experiment and methods that we discuss in this paper ground on theories and references of what could be named the “relational paradigm”, references that span from early work on system thinking to more recent work on post-human design. The notion of Pluriverse grounds on the disruption of such dichotomy, and so far, it seems the more inspirational to offer a framework for what Arturo Escobar calls “design of transition”, a design able to react creatively to the crisis of the environment, the society, and the cultural meanings. In his words, “to nourish design’s potential for the transitions, however, requires a significant re-orientation of design from the functionalist, rationalistic, and industrial traditions from which it emerged, and within which it is still functioning with ease, towards a type of rationality and set of practices attuned to the relational dimension of life” (Escobar, A., 2018, prologue).

The importance of relationship and connections has been widely introduced from system theories and complexity science, yet if the “centre” is anchored and immutable, the look at complexity will remain functionalist. The Pluriverse is instead the space where everything but the binary can manifest; where relationships are emergent, where their direction and impact is not controlled. How would our understanding of complexity change if we would consider the planet as having many interconnected living systems? How would design and our modes of production change from a perspective of interdependence? A recent, very relevant conference from Design Research Society, Pivot (Leitão, R. M., et al., 2020), has pushed forward the concept of “designing a world of many centres”, and it has challenged formally the design community not to look for alternatives to the current centre, but to return to the archetypical complex form of the rhizome where centres are multiples, mutable, fluid and co-existing. The need of disrupting the binary paradigm is profoundly inspiring how we look at the relationship with the natural environment and how we address it from a personal, activist perspective and as a rigorous object of study. We see an opportunity to educate together with students in a holistic way, challenging the students to new forms of creativity and stimulating them to consider in a diverse way the reasons and the goal to pursue a design career: doing research, analysis, synthesis, and creative acts about and within ecosystems, thus discussing a research and teaching experiment whose purpose is not problem-solving or problem-settings, but rather the rediscovery of ecological entanglement.

## **2.1 Introducing the relational paradigm in design education**

This paper presents a studio course for undergraduate programme, its methodological novelty and its outcomes. Whilst being aware that one course does not compile a pedagogy, the studio is one among several initiatives about urban-nature re-connection, whose details are beyond the scope of this paper: other studio and elective courses, the creation of a research lab about ecology and design, the successful application of a major national research grant.



It is precisely because of the thrust of the Pluriverse call that we want to overcome such dichotomy and open to a genuine inquiry of nature in the way she emerges and manifests in the very real environment where our design acts. In recent years researchers and scholars have started to seek for new education paradigms of creative disciplines, and post-industrial epistemologies are being embedded in the curricula (Noel, L., 2020). In spite of being still far from envisioning an “ecological paradigm” for design pedagogy, we discuss ongoing research and teaching practice with the aim to provide methods, tools and their assessment. Both the notion of complexity and sustainability have always been the keyword of our academic work; yet, when committing to a Pluriverse design education, the first step has been to restructure the vocabulary including the concept of “ecology”: it opens to a more clear transdisciplinary scope, and it challenge the centrality of the human subject (as creator, as user, as stakeholders) in a more obvious way. In most of the cases, when we talk about “nature” we just refer to a generic term and we are actually overlooking the diversity of “earthlings”.

In 2019, on the stage of a keynote during Tongji Design Week, professor John Thackara shared the reflection that, as designers, we are continuously asked to create technology to support human thriving, and even more in light of climate, social, and political crisis all over: technological development is granted the hope of bringing humans and society out of the space of struggle. He expressed the urge to reframe such opportunity within the scope of the ecological challenges, suggesting that technology would make sense where and when it may support “all life to thrive” (Thackara, J., 2019). The very idea of “all life” is a concept of the Pluriverse and the subject of our education experiments. Thackara was talking on the stage of a conference about the intersection of design and AI. He suggested that design could help AI (and all the technology at large) to focus on “things that matter”, to look at technology in light of the benefits and the good that it may bring in the perspective of the Pluriverse: “Once we understand we are part of a living system, the reconnection with nature is not only possible, it becomes obvious. And once this reconnection is done, our creative priorities and our understanding of where to focus our energy and cultural energy can only change” (Thackara, J., 2019).

Such reflections open the direction of post-development cultures, which are not utopic but in experimentation all over the planet. Indeed, in such a scenario, the design will be stopping to sustain the system of consumption and starting to contribute to different forms of ecological coexistence. We are offering the students the possibility to think and act in this space and root the experiment in a radical context: the social and cultural area of a mega-city. The overall conversation about human-nature reconnection must happen “out of the wild”: it is not about bringing everyone to the forest - and in fact, we believe that we may stop going to Nature altogether to allow more rewilding. Queues of tourists at the top of Mount Everest and wild animals taking over streets and rivers of the cities during Covid19 have hit the headlines of the newspapers for the same reason: they are odd evidence of a broken relationship. In this tentative move from anthropocentric design to ecospheric design, scholars question the epicenter of the discipline, to shift the focus from the complexity of needs and solutions for humans towards the complexity of the well-being of the Earth: “it is not meant to resign to human condition and its survival right. The aim is a change of conscience in order to recognize ourselves like an eco-dependent species of the conditions that Earth gives to life” (Acosta, G. G., 2010). A new ecological pedagogy may decentralize the human beings as the only actors and addressee of design acts; at the same time it overcomes the paradigm of “sustainable design” which often is misunderstood as an oxymoron to growth, being focussed on the management of complexity more than sustaining its balanced dynamism.

The reason to discuss a teaching experiment within an academic and pedagogical framework is because - in this process of ecological shift - a systematic observation and a consistent reasoning is necessary, bringing a reflection about which are the tools of the classroom, for inquiry, ideating, creating, disseminating. The pedagogical toolkit of design is essentially anthropocentric, from the tools for empathy to the instrument of user feedback and analysis, including some very basic elements of the vocabulary. For instance, as Haraway (2008) suggested, “earthlings” is a non-binary, unifying word that substitute the human/nature dichotomy and leads to a rephrasing of the whole grammar of conversation. Likewise, the definition of wicked problems and the examples of complex systems' usually look into artificial or human-relevant networks as a proxy of understanding. They may describe the complexity but they miss to articulate the notion of entanglement, which would be better displayed while using marine animals or forests as subject of conversations and examples.

In the following paragraphs we elaborate more on how the classroom becomes a stage to discuss, assess and modify the tools we use when designing within the Pluriverse. The reflection about the toolkit is crucial to design discipline as Ivan Illich pointed out: tools are artifacts but also “services, symbols, rules, institutions, policies, pedagogies, systems, environments”, and so on. Tools constitute aspects of social life that we deliberately create to (re)shape the tangible reality (Illich, I., 1975). We do not have complete answers when students ask, “what is this for?” or “how does this sustain our professional career?” and even more “where are the users that we are designing for?”. The teaching experience that we are discussing with this paper attempts to provide some of these answers, or at least preliminary steps in that direction.

### **3 Teaching within the Pluriverse**

Our studio brings the relationship between design and nature to the forefront, challenging the students with bluntly nature-devoted briefs. We invite the students to design and produce creative acts in the form of service to nature, by highlighting in a clear and systematic way which is the ecological subject or relationship that design aims to work with. The course is the final design studio before graduation; it is open to all the design disciplines (Industrial Design, Environmental Design, Media Design, and the collaboration among them). Within the undergraduate programme, it is the only elective course: professors are called to submit topics for the studio one semester in advance, and students decide which studio they want to attend. Ideally, participation in the studio will trailblaze the topic of their graduation design as well. This year, we tried to propose an “ecological shift”: putting aside LCA, circularity, social innovation, climate change, and other references to more established design modes of sustainability, we embraced the definition of deep ecology widely, and we gave the students the open brief of “reconnecting with nature through interactive artefacts”. Deep ecology is an environmental philosophy built around the convergence of ecological science and ecological wisdom; it is scientific in the way it conceives the functioning and mechanism of life within the biosphere, and it recognizes the very meaning of life in the Pluriverse relationships which involve all the elements of nature, organic and inorganic, material and perceived, including all their possible time and space manifestations. It has no space for anthropocentrism, rather, it is founded on eight principles, the first one being “Inherent value. The well-being and flourishing of human and nonhuman Life on Earth have value in themselves (synonyms: intrinsic value, inherent value). These values are independent of the usefulness of the nonhuman world for human purposes” (Naess, A., 2009). These eight principles manifest in three phases, defined as “deep experience”, “deep questioning”, and “deep commitment”.

We explore a parallelism of these phases with the understanding-analysing-creating steps of design process: we believe that deep ecology has a profound potential for students to embrace the Pluriverse, because it requires adjustment and experimentation with languages, with points of view, with research methods, and with the creativity tools as well. Other forms of environmentalism can be intensely materialistic or have a consumer-oriented outlook; for example, to the many uses and contexts in which we talk about “natural resources”, or whenever we design something “to help animals and plants”. The first one is a very brutal materialist language whose semantic refers to exploitation, extraction, and in a broader sense, to the paradigm of dominance that the Pluriverse tries to deconstruct. The second is an example of intrinsic dichotomy where we place humans in a position of dominance with a bigger value of knowledge, intelligence, or means. Deep ecology steps back to the simple equation that all nature is life, in its radical simplicity, yet with a sense of mystery that we can inquiry from depth and from diverse perspectives, and with an aesthetic that includes both growth and decay.

### **3.1 Studio at a glance: The nature-oriented design brief**

The studio lasts for nine weeks, and it is built around a mixed form of project-based learning and flipped classroom methods. Students meet twice a week for four hours, and they are supposed to dedicate most of their time to this project. There is one introductory lecture, which frames the design space, introducing some ecological vocabulary that may be entirely new for the students. Some of the lessons are hosted off-classroom, in parks or in public places.

The brief has two critical challenges: the first one is conceptual, how to define nature from a deep ecology perspective, which relationship of entanglement can be explored in its discovery; the second one is methodological, how to utilise fabrication as a methodology of design in the process of

learning-by-doing, not only connected to the format of outcomes: these two challenges go along throughout the studio.

The brief is disruptive to the students, who are used to receiving obvious requests about the design space and to perform projects in mainly execution mode. Rarely the “what to design” is an open-ended process. In this case, the very first challenge is to define Nature. It is a matter of fact that, mostly in urban environments, when we think of Nature we are thinking of trees and animals, or a sub-set of them at the scale of our senses. The variety and complexity of Nature manifestation at the micro and macro level are mostly overlooked. In many cases, people recall Nature only in the forms of its domination (potted plants or pets), and by antithesis, a generic concept of “wildness”. Suppose the design is a discipline of languages. In that case, it is in this terrain that the studio operates: exploring, searching, and forming a language that can help us to speak of Nature more consciously, after a process of authentic and embodied exploration. We can superficially think that Nature in the city is limited. But if we look at nature truly as a system, if we embrace the relational paradigm, then Nature manifests in leaves moved from the winds, in cracks of the cement, in a myriad of sounds, in the steady presence of soil and earth, even below the thickest layer of concrete. Thinking of Nature as a system within an urban environment allows for the rediscovery of hidden entities, relationships, and dynamics. It requires us to study in greater detail, to explore its complexity in the way Deleuze (1986) would have defined it as “*becoming-minor*”, a process of multiplicity, not equality. Tools, methods, processes, and interfaces to make this possible are at the stake of the design challenge.

The studio starts with an exploration focused on searching with new eyes and interest where and how the elements of nature (air, water, wood, earth, fire) and all the possible earthlings manifest their presence in our daily life. Maps of nature in the urban environment are produced as a research output. But where such “new eyes and interest” may come from? The exploration starts from the first day: students’ first assignment is to engage two hours in a free walk between two points of the city, carrying with them a notebook, a camera, a printed map, and a compass. The walk’s goal is to map natural elements and evidence of the relationship between them. The instructions are expressed in the language of suggestion and possibilities, not of limitations or constraints: “go to an unfamiliar route, don’t be worried about the weather, and keep the GPS off”. Likewise, requirements are open ended, such as looking for evidence of multispecies interferences, bringing back samples of decay, discovering and reporting a playground of mutualism. The learning experience progresses over several weeks through explorations and discussion: if we demand them to ideate and produce devices for human-nature reconnections, we have to offer them a platform to discover such connections in the first person.



Figure 1 (top left) and figure 2 (top center): printed maps of the explored area with hand-drawn notes.  
 Figure 3 (top right): detail of the second exploration's photographic report.  
 Figure 4 (bottom left) and figure 5 (bottom right): exploration's report sharing session in the classroom.

Substituting a classical research task with an exploration is a first step to deconstruct the typical teaching in favor of experimenting in a pluriversal space. Students expect to provide research around a given brief, usually performing some sort of user research, engage in analytical reflections, coming up with design concepts, and execute design tasks upon validation of their meaning and feasibility. In the application of design thinking and HCD the implication for the students is that they have to arrive at the end of the process, and very often they just jump straight there. In this sense, the way in which HCD methods are utilized in the classroom are often prescriptive. The anthropocentric design scope which we usually work with are not necessarily known, but they are relatively easy to be imagined - or to be simulated by following all the steps of the process. We use words and rational tools to engage with empathy - and whilst we believe that HCD has a meaningful operational value, we also discuss its interest within the scope of Pluriverse. How can we engage in an empathic way with earthlings that we cannot speak with? Starting with an exploration, instead, most likely we get lost, we find nothing, and this is the method that we cherish to start to work on entanglement: nothing has to be found because everything can be a meaningful subject. The research and the project progress by emergence, a little step at a time. We start on day one writing the definition of nature on a piece of paper, and we conclude the last day with another definition of nature, which has been transformed by all the steps. We ask the students to stick with observation-immersion-learning, recognizing the value of their own idea because it represents a learning token about one aspect of the ecology and not because it can be explained in a structured and organized design language.

### 3.2 Studio at a glance: The fabrication methodology

As we mentioned above, the studio is also rooted in the use of fabrication as a primary design methodology of learning-by-doing. We invite the students to use fabrication as a progressive way to assess and give shapes to the experience in which they are engaged, to support their exploration

with experimental devices, to continue trying new ways of looking and sensing, playing with scale and distance, with shapes and forms. As much as possible embodied, we believe that creative practice can more readily help us break through the nature/culture dichotomy we have been cultivating for probably most of our lives. The whole course follows a thinking-through-making approach, with an incremental degree of complexity: over nine weeks from the first exploration to the exhibition of the working artefacts, students have conceived, ideated, and produced 2 hours, 2 days, and finally 2 weeks prototypes<sup>1</sup>. From previous teaching experiences we were able to observe that students' fabrication skills in our college are not consistent, largely depending on the personal experiences and interests of each student and the curriculum of study of the department they are enrolled in. Apart from the few basic skills that all students learn in the first years, undergraduate students are not given the opportunity to refine their skills, although being encouraged or even required to prepare physical models to present their projects. Students have access to the prototype fabrication facility, but they often rely on the help of technicians and in any case, only to produce simple material models to present their projects. Due to relatively cheap prices, many of them consistently use third party services for their final prototypes.

Therefore there is also a large pedagogical scope in highlighting the importance of craft prototypes and the support of an embodied design practice, mostly because the students come from different backgrounds, and were asking to work intensively in practice base teamwork. For the hands-on and thinking-through-making methodology we decided to adopt to have more chance of success, we identified three interventions to reinforce three respective elements:

1. Gather knowledge over students' pre existing fabrication skills
2. Identify the weaker or absent skills and design short workshops or activities to improve or introduce them
3. Define appropriate class exercises and assignments that could be performed with fabrication activities.

Before the class started, we circulated a questionnaire to ask the background of students' fabrication skills level. The results were then used to decide which topics we would have included.

Unsurprisingly, most students answered to be fairly familiar with Laser Cutting and 3D Printing, while we were not expecting their (perceived) lack of more traditional manual skills and physical computing. Therefore, we scheduled a number of short workshops, class exercises and assignments to reinforce, introduce and make use of fabrication skills: rapid prototyping, molding and casting, biomaterials and bio-plastic, microcontroller programming. It is undoubted that, compared to the majority of other courses at undergraduate level, in this studio the account of hours spent in activity of making, instead that lecturing and brainstorming, has overcome the 80%.

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<sup>1</sup> The time here is used in a flexible way: for the final project in fact students had one more week of manufacturing, but yet it was useful to keep an incremental framework for their hands-on activities.



Figure 6 (top left): Creating samples of starch and agar based biomaterials in the Biomaterials fabrication workshop.

Figure 7 (top right): Student working with alginate in the Moulding and Casting workshop.

Figure 8 and figure 9 (bottom): details of alginate moulds and plaster castings of elements collected in the field exploration.

#### 4 Discussion of the teaching experiment and its values

In the following diagram we summarize the overall structure of the course; we use design thinking as a schematic traditional process, and we re-frame it in light of the framework inspired by deep ecology. Each of the phases produces a project: the first one is a 2 hours prototype in the form of a research tool “for the self”, to support the student in the immersion and re-positioning in the ecology. The second one is a 2 days project, made in teams, and aiming “to dialogue”: students design artifacts to transfer the learning experience and engage others in the same act of repositioning. The third one is a 2 weeks project in which the students fully embody an aspect of the ecology and place it at the center of their design proposition.

Exploration is different from empathy because it allows discoveries that are embodied: everything discovered in an ecological framework contributes to a stronger sense of entanglement of the complexity and represents a permanent learning experience; empathy instead may be instrumental for a research phase but may not persist outside of a project scope.

In the same way, deep questioning is different from analysis: there is no data to be presented to others, but the potential engagement in discovering the entanglement.

The design outcomes are then tested and prototyped for the users, whilst deep ecology suggests that the design is a commitment to embody the Pluriverse discovered in a new perspective over reality.



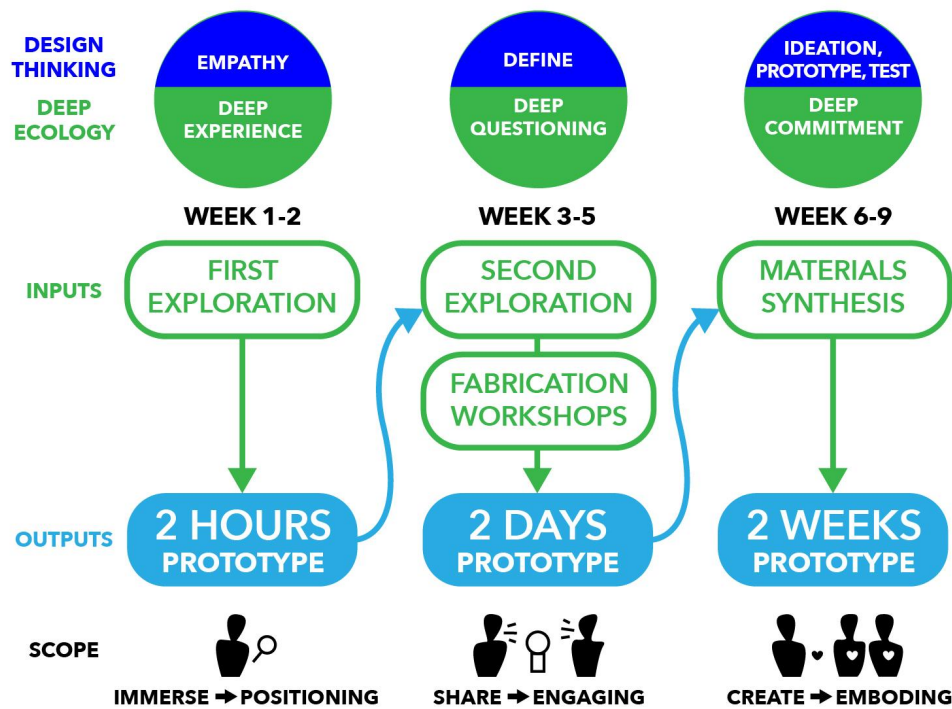


Figure 10: Structure of the course based on ecological framework

At this stage, this framework is not complete, but it is a way to reflect on the quality of design outcomes, the value of the teaching experience, and the ways of its implementation. We believe that Pluriverse design can find roots of creativity in ecological wisdom. We are currently running the second edition of the studio and applying the same model of deep ecology as a driver of creativity to other courses. We are aware that students are challenged in many ways, which we try to highlight:

- The goal of the exploration is to collect a diversity of ecology observations, so then nature can be collectively seen as a plurality of centers and identities. It would be much harder to reach this goal if we only require the students to study a given element of the ecology.
- Reducing anthropocentric perspective means that explorations happen in more phases, with students able to recombine materials and inputs that come from everyone and not only from their own research path.
- Students struggle a bit to be open to such recombination, they are eager to jump to conclusions and propose “solutions” in the form of concepts that can “help someone” or “make something better”.
- Therefore it seems hard for them to accept a progressive learning based only on a better understanding of what nature is and how it works: despite this being evidence of a real “re-connection”, this seems not enough to satisfy their eagerness to do “design which solves problems”.
- Regardless of the challenges, if we look at the “nature definitions” that students write on the first and last day, the differences are evident. All of them move from using a binary language in which humans and nature are separated and mostly in conflict (with a sense of nostalgia



for the “nature in the hometown”) towards a definition that highlights relationship, mutualism, and agency.

At the end of the studio, we submitted a questionnaire<sup>2</sup> to the students to assess their experience and collect feedback. Students appreciated outdoor classes and they claimed for more; they also mentioned the “method of radical observation” as a skill that could be valuable for future projects. Some of the comments were about the understanding of Nature - *“I found that the plants really have emotion and feelings. They seem to be in contact with each other”* - suggesting to us that there is much more space for reflecting about interaction and relationship within a Pluriverse framework. Sixteen students have produced six projects, which covered a large spectrum of fabrication techniques, and equally importantly, they offered radically different perspectives on nature. Animals, plants, mosses, chlorophylls, insects, flowers, bushes, woods and leaves, represent the variety of subjects involved, each of them aiming to a specific form of reconnection. Projects comprise interactive devices, public installation, crafts artefacts, jewelry, and bio-media: we consider this a positive outcome of the experiment, since the students were free to choose the medium of their project, and the final exhibition showcased a rich variety of design formats.

The project “New Instinct” (figure 10) is a collection of two wearable devices that use electronics to let the wearer experience the senses of animals: oysters, and their ability to perceive the sea tides, and birds capacity to navigate using the magnetic field of Earth. In the project “Plantbour” (figure 11) the students created a metaphor to reflect on nature exploitation. They described the plants as part of the economic system that regulates a city, considering plants as labour. They created an interactive model in which plants could receive more or less income (water) and workload (CO<sub>2</sub>), with the balance of such elements having an effect on the stability of the system (the model shuts down when the balance is broken). The concept of balance in the human-nature relation was further explored by the project “Garden” (figure 12), a synthetic-looking garden where insect-shaped origami are placed on tilting bamboo canes. By moving and changing the position of the insects, people can experience the fragility of the eco-system, whose balance falls with the slightest change. The project “Welive” (figure 13) experimented with a bio-material composed of agar and camphor tree powder and proposed an application of this material as a substrate to grow moss. The material was moulded and combined with moss in small tiles and applied to structures such as metal handrails and staircase rigs as a way to bring natural elements to indoor spaces. “Piu Piu Bush” (figure 14) is an interactive device, which stimulates discovery and cooperation. Hidden in the bush are several flowers attached to servo motors controlled by an array of distance sensors. When one or more people approach the device, the distance and position of the person make the flowers come out of the bush. People can cooperate to control the device and trigger different behaviors. “Natural Ritual” (figure 15) is an attempt at designing an experience that engages people in a circular bond with Nature. To perform the ritual, natural elements are gathered from nature, they are transformed as temporary jewelry, until they are brought back to nature, where the cycle can start over again.

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<sup>2</sup> Link to access the students questionnaire <https://forms.gle/yhYwJveich7kAkDN6>

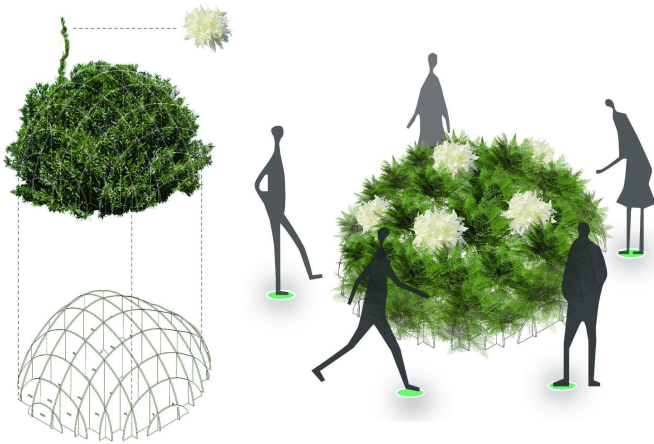
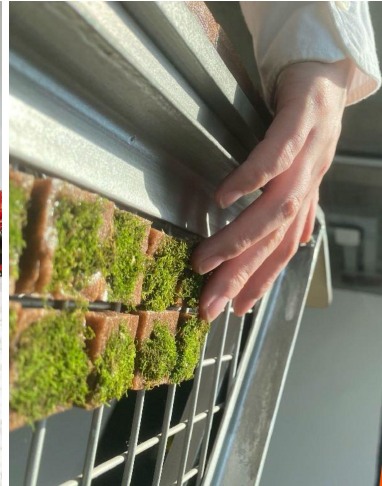
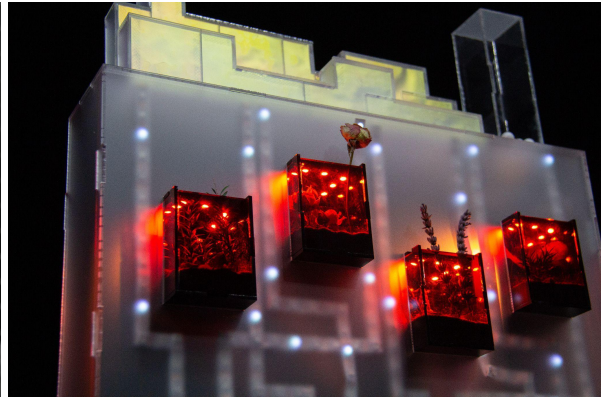


Figure 11 (top left): New Instinct. Figure 12 (top right): Plantbour.  
 Figure 13 (center left): Garden. Figure 14 (center right): Welive.  
 Figure 15 (bottom left): Piu Piu Bush. Figure 16 (bottom right): Natural Ritual.

## 4.1 Conclusions and future work

The rationale of the studio is to provide an intensive activity of design which may then be expanded in the graduation project. Three of our students continued their journeys in exploring how city and nature connection can be designed and manufactured; two students from other classes were inspired by the exhibition and chose Urban Nature as their graduation subject, too. One of our students made a graduation project about moss-generated electricity for sports wearable, and she has already been awarded several prizes; she continued with a MA in biology. Some of the projects have been showcased at the Shanghai Biennale in March 2021.

We believe that these are positive signs of the interest from the students, which challenges us to improve the teaching framework and provide more structure for the reflection about designs for the Pluriverse. We ought to be the first one comfortable in a pluralistic space, if we want to be able to expand the impact of our creative skills. Yet, by looking at these first projects, we are confident that there is a lot to discover ahead. To provide measured assessment of course several iterations of the teaching will provide more materials and data to reflect on, but we believe that it is crucial to move the designed artefacts into public space. These six projects have been exhibited and have been utilized, yet mainly within the school context and without a structured way to collect feedback. In order for such an experiment to really support a wider research inquiry about Urban Nature we may need to dedicate some time of the course to this specific task.

This would bring the students to design even more radically outside of their comfort zone, yet it would be relevant to verify how much the Pluriverse, as an alternative paradigm, can become a design scenario for urban coexistence. The same process of discovering and agreeing on Nature definitions which we shared with the students needs to be performed with citizens at large, so then the elements of urban nature can be visible and accessible to them all. We believe that this work of creating conversation and action about alternative, embodied perspectives towards Nature is a critical work to create ecological awareness.

As we mentioned, this studio course is one action within a larger, funded research programme on design and nature, started in early 2021. It comprises participatory action of Citizen Science, as well as similarly Nature-inspired design briefs offered to other courses. At the moment we are validating the outcomes of a class in data visualisation which uses nature-related datasets. Each step is fragmented, and yet each action counts to make the Pluriverse visible.

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