

# Open Learning on Urban Ecology Through Interdisciplinary Integration Scenarios - The Nature NIDI Open Data Platform

## Abstract

The term Nature NIDI was originally used to describe small-scale, obsolete urban spaces that naturally evolved into wild, vegetated states due to lack of human management. These represent not only indispensable habitat, food sources and corridors for urban wildlife, but also crucial urban heat sinks, water management zones, air purifiers, etc., as well as vital urban green spaces for humans.

NIDI have already become popular study sites for ecological science researchers. However, in social science and design fields, NIDI are often neglected or even rejected, which allows them to easily be undervalued, if not ruined, by owners, users and authorities. This produces negative consequences for the urban environment, while a city's precious natural, ecological resources are wasted. As the diversity and characteristics of NIDI tend to involve numerous aspects and various professional fields, this article advocates the popularization of NIDI via interlinking various fields, communities and resources.

For NIDI popularization, open education appears to most effectively integrate available interdisciplinary resources. NIDIs have tremendous potential for, say, outdoor educational activities organized by nature education institutions, and thus influencing countless non-professionals. Simultaneously, non-professionals can also provide substantial local wisdom, manpower and data for education institutions, researchers and planners. This text outlines thus an interdisciplinary cooperation by nature education institutions, natural and social science researchers as well as designers.

The author proposes the establishment of an open data platform about NIDI. Service system design thinking brings together interdisciplinary resources and personnel. The service system is driven by a primary database which is established by designers and ecologists. The platform and knowledge of NIDI will be promoted to communities by nature education institutions to involve local participants. Direct benefits from the NIDI platform shall render participation attractive for all potential stakeholders. Ultimately, the database will be updated by users and feed back to various professional stakeholders. This interdisciplinary open learning approach not only enables non-professionals to obtain professional knowledge and benefits from urban green spaces, but equally enables professionals to receive data feedback from varied sources, which exemplifies mutually beneficial and win-win design thinking.

This article conveys a prototypical solution of how designers can effectively and efficiently cooperate with other disciplines while creating open learning scenarios and employing existing resources. In such interdisciplinary innovation, designers not only design a platform or an exchange system, but communicate with experts across disciplines and social groups, connect professional fields and also act as facilitators and integrators. Design not only carries out operations and services, but also initiates learning and development and fosters participation and assimilation. Design acts as the driver for interdisciplinary integration.

## Keywords

Nature NIDI, Open Learning, Open Data Platform, Interdisciplinary Integration

## 1. Introduction

The concept of Nature NIDI was first described as the precious places of real nature in the city and intimate nature places in urban areas. The Nature NIDI spaces are truly existing in cities and becoming a part of urban landscape that should not be neglected. They are the most convenience green spaces for public to reach, while providing multiple biological habitats for the urban animals. During the past years, the presenter tried to perform statistics, information integration, and file creation for Nature NIDI for related ecological research and ecological knowledge popularization. At the same time, the presenter wanted to aroused

public concern about Nature NIDI and changed the social bias of its existence via the relevant researches.

Furthermore, we are not the only organization concerning the Nature NIDI. Nature NIDI provides a solution of 'finding newly defined nature'. Emma Marries, environmental journalist and writer from United States, presented her points of Nature is Everywhere via the speech she gave in TED Talk, 2016. This speech presents a new popular theory that many environmental ecologists currently support, which is the wilderness spaces in communities can also be defined as Nature because their less need of management and less influence from human. The Nature NIDIs thus have huge potential for holding nature education outdoor activities and providing space for local experiencing the nature creatures. They can also be used as sites for ecological researchers observing urban animals' data and multiple bio-conditions. In addition, most of Nature NIDIs are produced by the specific urban construction process of China, which gives the urban planners a higher perspective to study them. Taking into account the diverse values that Nature NIDI displays, we decided to use interdisciplinary resources to create open data platform, building systematic and sustainable relationship to active more possibilities for Nature NIDI.

## **2. Ecological Research of Nature NIDI**

### **2.1 Ecological Definition**

At the beginning of this study, the author compared the Nature NIDI with the related synonyms Wilderness, Natural Environment, Urban Wilderness, Wasteland, Barren Land, Unused Land to clarify the research background.

Nature NIDI has a lot of ecological features similar to wilderness and urban wilderness in terms of ecology: ecological process is balanced by natural processes, ecosystem is stable, biodiversity is rich, and human disturbance is less. However, unlike Nature NIDI, the wilderness concept overemphasizes that natural areas are not subject to human influence. In addition, urban wilderness and wilderness are protected by relevant laws. Finally, the formation time and period of Nature NIDI are much smaller than the wilderness and urban wilderness. Nature NIDI, as a small-scale natural plot, often arises from the construction of urban planning and the production of a certain urban plot. Any construction related to urban elements may generate a large number of Nature NIDIs, and the existence cycle of these Nature NIDIs will quickly disappear or evolve into other forms as the city changes.

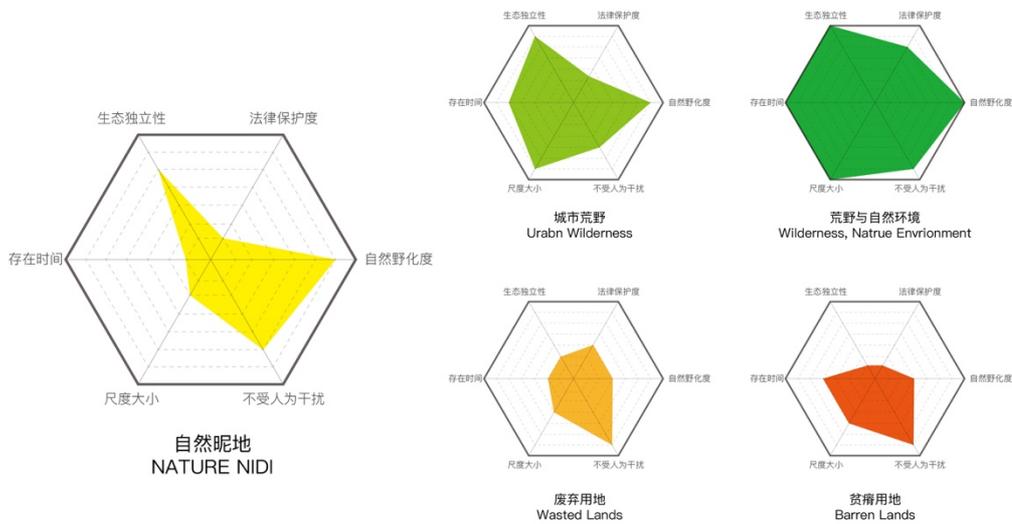


Figure. 1. Nature NIDI definition comparing with other conceptions (by author)

## 2.2. Ecological Research Tool

After clarifying the background of Nature NIDI, how to analyze and study the Nature NIDI and what kind of research method is the most important issue. The commonly used theories are Ecological Niche Theory, Biological Diversity Theory and Landscape Ecology Theory. After summarizing the relevant literature, the author selected the landscape ecology theory as the ecological research tool of Nature NIDI studying.

There are several ways in landscape ecology to evaluate a spatial environment. These research methods can be summarized into two levels of perspective: macro and small scales - that is, Nature NIDI can be evaluated as a single plaque itself for internal ecosystem research, but also as a unit of city landscape system. After comparison, the ecological state of Nature NIDI will be discussed from the perspectives of plaque spatial structure, landscape heterogeneity, ecosystem balance, ecosystem complexity and landscape connectivity in the article.

## 2.3 Research Prosses

In the field of ecological research, the paper is divided into two stages. The first stage is to collect the Shanghai Nature NIDI data (research field: Nature NIDI of the Shanghai Science and Technology Museum West Side Wetland). The second stage is to qualitatively explore the landscape ecological assessment conditions summarized by the author.

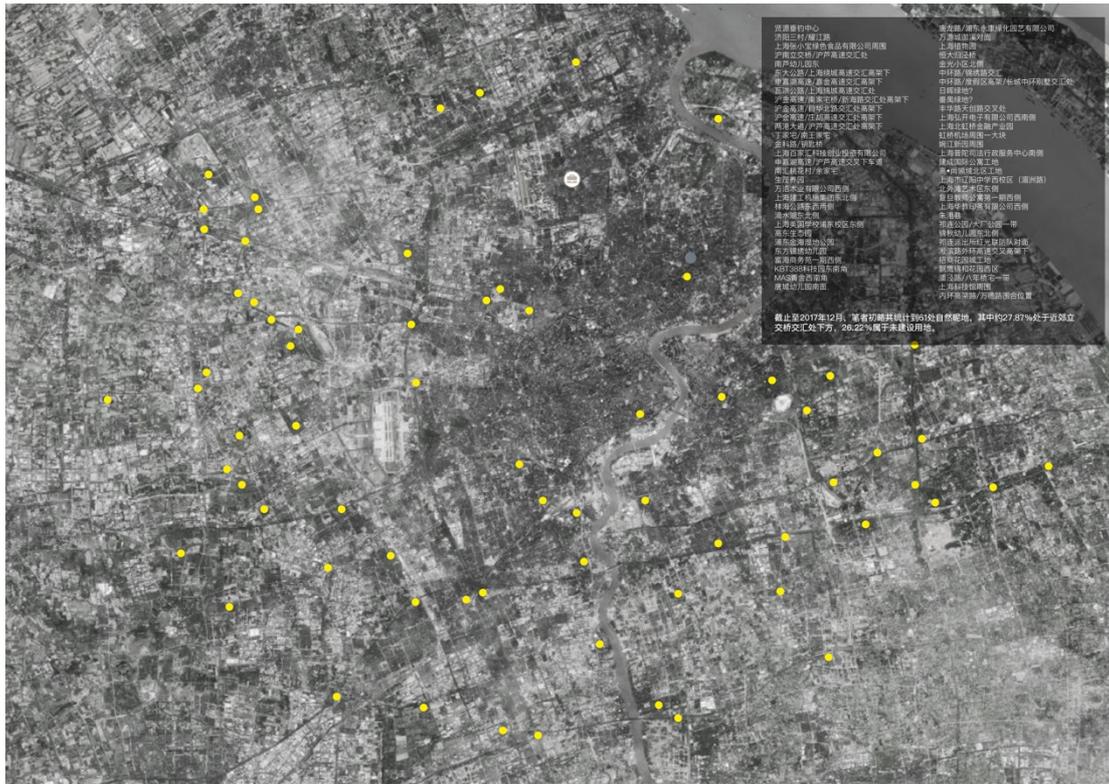


Figure. 2. Shanghai Nature NIDI primary Mapping (by author)

In the research process, in order to facilitate the identification of the natural position of Nature NIDI in the 'artificial green space' ecosystem and the 'pure wild nature' ecosystem, the author established four extreme ideal imaginary contrast items as reference standards: reference habitat UL, US, WL, WS. Therefore, in the process of establishing a hypothetical item, the conditions of the scale are changed separately by using "manual" and "natural" as two levels. Among them, reference habitat WL can be seen as a complete wild natural environment, reference habitat UL and US can be seen as complete artificial green space, and WS is a small-scale urban wilderness close to Nature NIDI. In the specific evaluation process, the qualitative evaluation conditions will give the comparative reference value of Nature NIDI and reference habitat. For the quantitative condition, the calculation results of Nature NIDI and reference habitat will be given.



Figure. 3. Reference Habitat Coordinate (by author)

## 2.4 Conclusion

After various analyses, I found that Nature NIDI mainly displays the various characteristics of "plaque" in the landscape system, and occasionally provides the role of "corridor" and "matrix boundary". The five-dimensional map can be obtained by summarizing the ecological niche of Nature NIDI in five aspects of plaque spatial structure, landscape heterogeneity, ecosystem balance, ecosystem complexity and landscape connectivity. In the figure, the green area represents a bias toward the "natural" feature and the red region represents a bias toward the "artificial" feature.

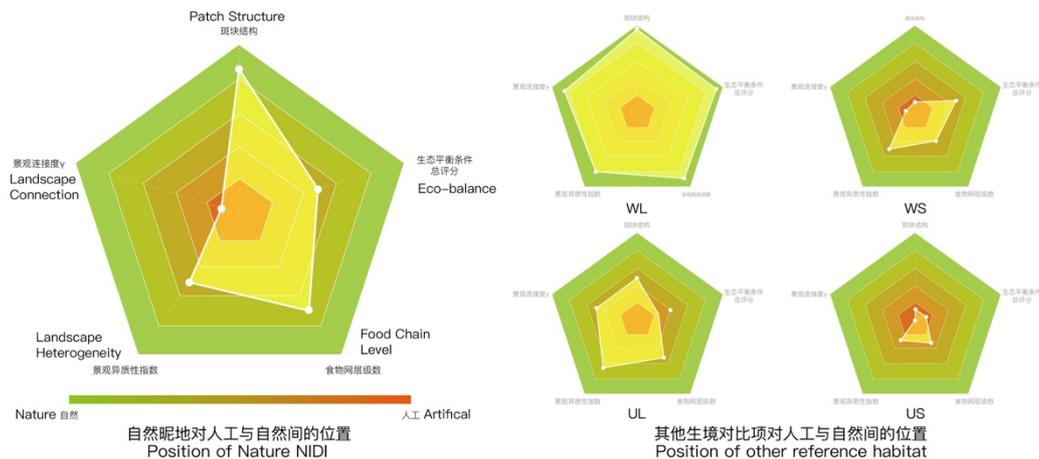


Figure. 4. Nature NIDI and Reference habitats position (by author)

In summary, the author concludes that:

- Nature NIDI is an urban green patch in an excellent ecological environment, which is closer to the "natural" state of the environment than urban artificial green spaces.
- For the internal ecosystem, Nature NIDI's ecological status is close to the "natural" wild state, maintaining a high species richness. This feature is quite different from the state of the green space ecosystem in the city, so it is an indispensable corridor and habitat for urban organisms.

For urban-scale landscape systems, Nature NIDI has the ability to enhance its landscape richness, connectivity, and interference with diffusion, and thus has a positive positive effect on urban ecosystems. It has an important influence on urban ecosystems, similar to the ecological orientation of urban artificial green spaces, but it also compensates for the lack of functions and ecological elements of existing urban green spaces.

## 3. Nature NIDI Open Learning

Due to the limitations of the nature of Nature NIDI, it is not feasible for designers to modify and redesign the physical NIDI physical space when using Nature NIDI resources. Therefore, unilateral learning of Nature NIDI resources is more appropriate. In this regard, the author conducted a literature study on open data, open education resource, and collaborative learning. The author discussed the cross-cutting fields of these three types of related fields

under open learning scenario, thus clarifying the feasibility of using the open learning method to integrate various learners to create new knowledge and new resources through the open learning method. The use of Nature NIDI resources with open learning as an integrated approach.

### 3.1 Open Learning with OER

In traditional open educational resource discussions, Open Education Resource (OER) is often limited to educational information. With the advent of the era of big design, today's social industry is facing new integration and demand, and the application of traditional open innovation methods is not limited to its original source. In this concept, the life cycle of the entire OER is an iterative process. Through this cycle, both creators and users can guide the updating and replacement of learning resources through related behavioral activities. The author believes that OER's thinking not only supports the transformation and change of resources, but also supports new information sharing and writing between users. The fundamental purpose of OER is consistent with Collaborative Creation – still the output of new information and resources. The concept of OER is not only designed to adapt to sharing, but also to innovate and generate more high-quality usability resources, open up the possibility of creation and share new information of these outputs, thereby inspiring new activities, forming a cycle, and driving the entire collaborative learning. The operation of the system. Therefore, when the author is not limited to discussing educational resources, but expanding the scope into innovative resources, the guiding significance of OER will be more clear. Together with the Collaborative Learning approach, it will become a way of thinking in the process of building an open and innovative community, expanding the possibilities of innovative resources. Combining the two is exactly the Open Learning system.

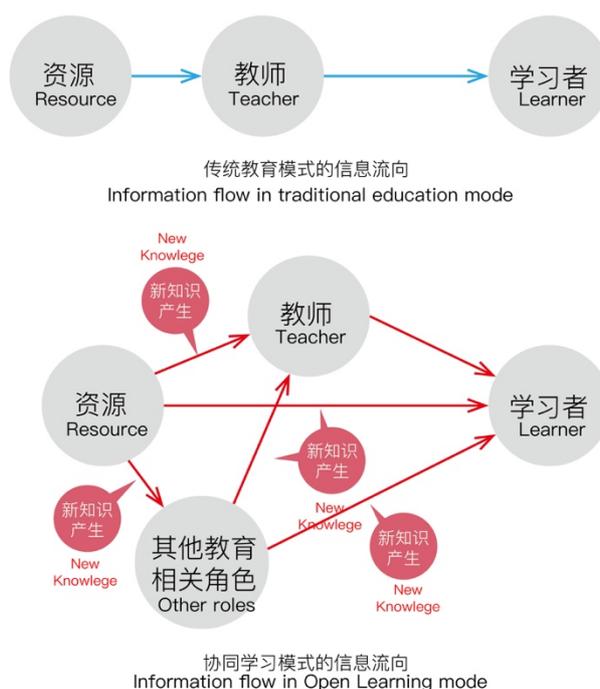


Figure. 5. Difference between Traditional Education and Open Learning (by author)

## **3.2 Social Resource of Nature NIDI**

### **3.2.1 Nature NIDI and Bioscience Research**

The author has met many times with bioscience researchers who are collecting biological data during the field research process. In the interviews with them, the author learned that the place is very well known in the biological researcher circle. As an ideal wild plot with appropriate scale, diverse habitats and less human interference, Nature NIDI has become the actual site for many bioscience researchers to observe and record biological data. Due to the number and diversity of Nature NIDI in Shanghai, Nature NIDI is fully capable of meeting the needs of most bioscience researchers for field observation sites. Nature NIDI not only has a variety of habitat types, diverse species richness, but also geographically diverse, able to meet a variety of observation tool erection and observation methods. At the same time, there is very little communication between the existing researchers on the actual research site, so there is a possibility of building Nature NIDI data sharing in the future.

### **3.2.2 Nature NIDI and Nature Education**

Under the current status of the natural education industry, outdoor site selection has become the most important offline activity condition for the nature education industry. Natural education institutions not only need to consider the safety and ecology of site selection when conducting site selection for field activities, but also need to consider the possibility of event hosting and coordination among parties. Therefore, site selection often becomes the biggest problem in hosting wild education activities. Natural education institutions generally prefer to choose 'pure natural pollution with less pollution' in the field selection process, which is explained from the ecological point of view, that is, less human interference. Most of the Nature NIDI in the city range has long evolved into a wild land due to lack of human management, and is ultimately in an ecologically balanced state. They are rich in species, most of them are native species, with strong vitality and adaptability. The overall ecosystem is also in a high-intensity balance, with strong anti-interference ability, and can fully withstand the ordinary level of wild play activities. At the same time, such plots require minimal maintenance and only require a code of conduct for the activity planning phase. Therefore, the highly ecologically stable Nature NIDI is fully capable of withstanding the outdoor venues of basic natural activities. Connecting Nature NIDI resources to the nature education industry is a viable and ideal design strategy.

## **3.3 Nature NIDI Open Learning system**

In summary, the learning around Nature NIDI can be as follows:

- (1) For ecological researchers, Nature NIDI resources can be used more openly to enhance the learning efficiency of professionals in Nature NIDI. Nature NIDI geographic information can be shared, while the observation data of Nature NIDI can also be shared and updated.
- (2) For the community public, Nature NIDI resources can be promoted and popularized. Their ecological knowledge can be learned, thereby enhancing the ecological awareness of non-

professionals, increasing opportunities to access nature, and rationally and effectively utilizing the natural grounds neglected by the urban construction process.

(3) By combining the above two methods through open learning methods and introducing new stakeholders such as natural education institutions and urban builders, a larger range of Nature NIDI data open communities can be established to conduct collaborative learning and analyze data resources. Create, generate more data and new knowledge of new cognitive perspectives.

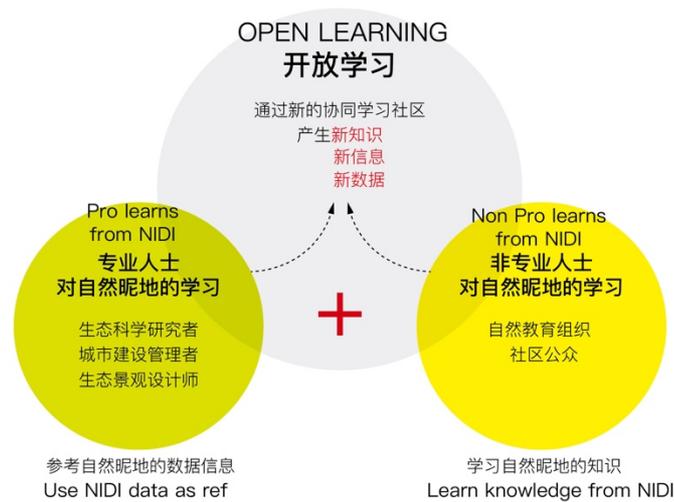


Figure. 6. Nature NIDI Open Learning structure (by author)

After forming an open learning community, the Nature NIDI resources will be integrated into an online information system to serve natural science researchers in the form of online communities, and relevant professional researchers will be invited to jointly manage, edit, and integrate Nature NIDI open data in the platform. . In this community, the founders collaborate with ecological science researchers to establish and screen initial data, and to provide Nature NIDI knowledge to the public through the promotion of nature education institutions. The public participates in nature education activities during the learning process. The Nature NIDI's offline space is actually used. During the use, Nature NIDI data is collected through special media and fed back to ecological science researchers and urban planning managers for professional reference. The learners in this community are also information producers, and generate new knowledge in mutual communication through collaborative learning:

- Through the nature education institution as an intermediary, the Nature NIDI resources can be introduced to the community public, so that the community public is willing to contact Nature NIDI
- Through the participation and experience of the community public, the Nature NIDI data can be collected in large quantities and fed back to ecological science researchers;
- Through the popularization of scientific knowledge of ecological science researchers, the community public can understand the ecology of Nature NIDI and be willing to participate in outdoor experience activities organized by nature education institutions;

Nature NIDI data generated by community people and ecological researchers can be fed back to urban planning decision makers to consider the management of Nature NIDI in the urban construction process to influence the community.

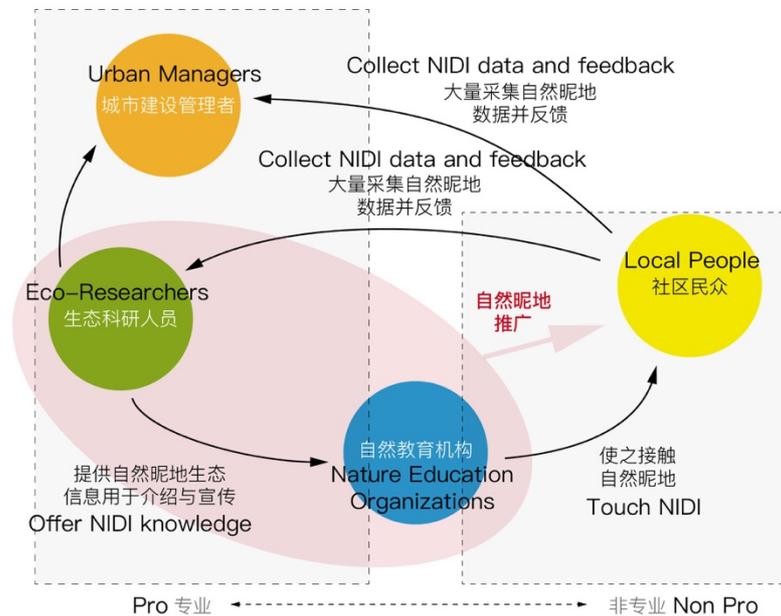


Figure. 7. Nature NIDI Open Learning system (by author)

## 4. Nature NIDI Open Data Platform

After integrating Nature NIDI resources into open data, building a data sharing community around its concept and adopting an open data platform as an important tool for carrying data sharing, connecting all stakeholders, and facilitating designer management, is the Nature NIDI that this article will adopt. Popularization strategy.

### 4.1 Platform Building Process

In the process of building the Nature NIDI open data platform, designers first need to complete the requirements analysis - including user research and functional requirements determination. In this step, the designer need to confirm the user population, the way data is used and the flow of data in the complete service system via the survey results. In the stage of platform design and construction, the designer completes the overall service framework design and interactive interface design, and the work related to platform construction and development is completed by engineers and technicians using existing system tools. In the later stage, after completing the initial data access and platform promotion, the Nature NIDI open data platform can be put into use. In the process of use, the designer (coordinator) role connects and coordinates the relationship of each participating role in order to complete the ultimate goal of collaborative cooperation.

### 4.2 Platform Service System

In the final platform operation, the location information of Nature NIDI is used as the most important data for users. Users can choose the NIDI they need to use on the web or mobile side according to their research needs, natural education activities or play needs. After the selection is completed, the user can go to the Nature NIDI space and re-record the Nature NIDI information (species, habitat, geographic location, etc.) that he observes into the database via the mobile terminal APP, thereby forming a data stream loop of the database. In the initial stage of the platform operation, the platform builder and the coordinator jointly input the initial data to complete the initial database setup. After the platform is operational, the database attracts users in the system via the information representation of the terminal APP. When the user forms a stable user group, a data stream will be input into the database, and after the database is processed and analyzed by the coordinator, the constructor and the system, the database update process is completed. At the same time, in this system, each role is not just all in each position. The ultimate goal of the Nature NIDI Open Platform is to create relationships between roles to complete collaborative and open innovation processes. While using the Nature NIDI open platform, there will be related behaviors between outside organizations, nature education institutions, and potential groups in the community. Focusing on nature education institutions, it will continue to attract new potential users and potential cooperative organizations. Naturally, Educational institutions can also provide their cooperation with outside organizations by inviting the participation of bioscience researchers. In this mode of operation, Nature NIDI resources will be continuously updated and continuously explored to give full play to their social value. At the same time, with the increase of participants, the public's awareness and recognition of the natural environment will continue to deepen, thereby reducing the threshold for the popularization of nature conservation education.

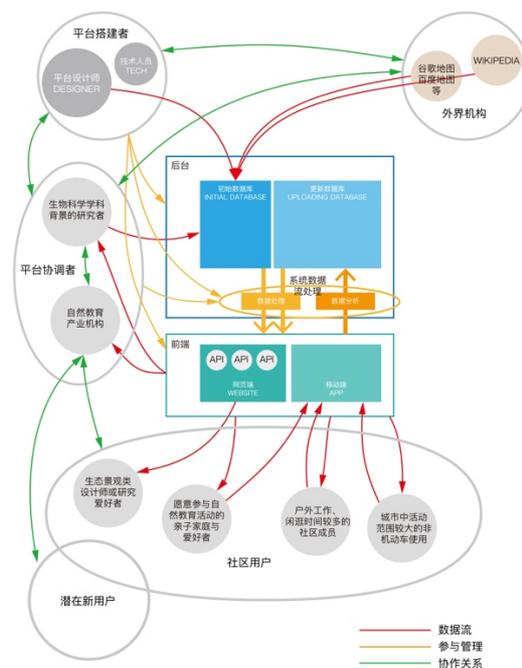


Figure. 8. Nature NIDI Open Data Platform Service System (by author)

### 4.3 Terminal APP frame and UI design

After completing the design of the Nature NIDI open data platform operation framework, the author also designed the interactive interface of its terminal.

In this design process, the author designed the observation points of Nature NIDI as: accessibility, habitat type, species. Species and accessibility are not graded, professional and non-professional users can meet the observation requirements, while habitat types only provide recording functions in professional user interfaces.

In order to comprehensively consider the use of Nature NIDI, and to distinguish the information decision-making power of professional and non-professional users, the author designed the N-Score scoring concept. The author defines N-Score as the three-dimensional information integrity evaluation based on habitat information, species information, and real-life photos. Each Nature NIDI's N-Score score can only be evaluated by professional users based on the available data displayed on the platform, thus ensuring its professionalism and data reliability.

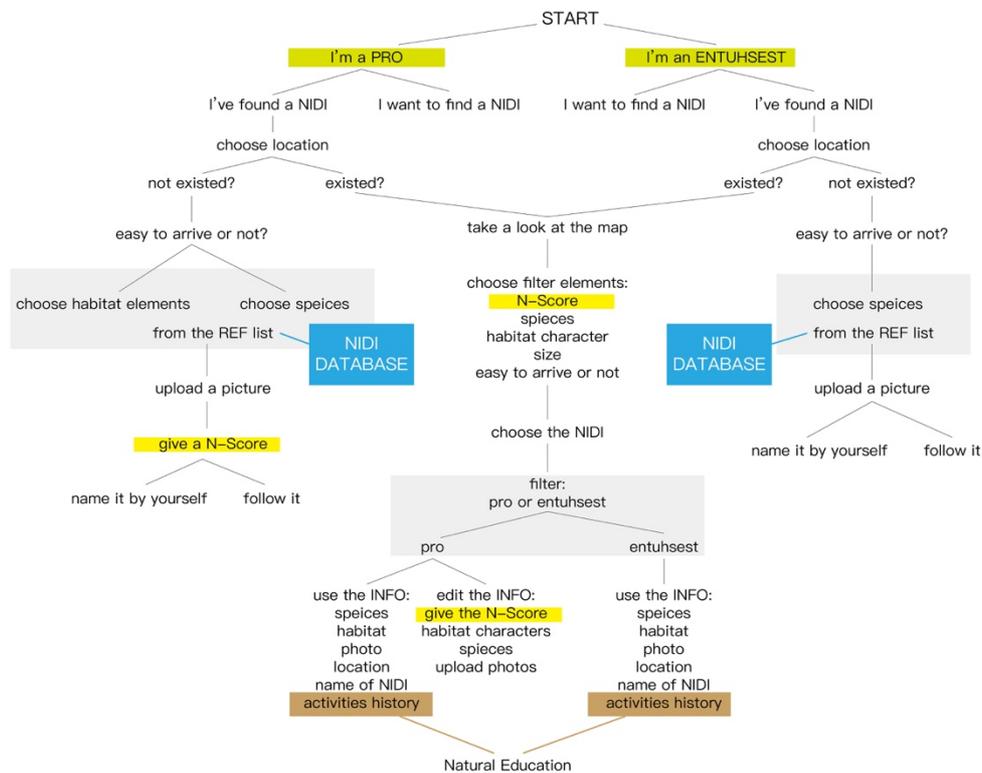


Figure. 9. Nature NIDI APP frame structure (by author)

The following is complete user journey map: After basic login and registration operations, the user will choose to be a professional or an interest enthusiast. After completing the selection, the software functions are divided into two categories, which in turn enter the Nature NIDI related functions. When users discover Nature NIDI, they can directly check whether the Nature NIDI they are in is registered via the APP's location function along with the existing map information. If not, they will enter the new Nature NIDI login function. In this function, the user will gradually complete the reachability judgment, habitat type selection (professional

user interface), species selection, live photo upload, personalized naming, home page attention, and N-Score score (professional user interface). Among them, in the habitat type selection and species selection steps, the software will actively provide a reference list in the existing database for user to directly select the species they've seen. When the user discovers that the observed Nature NIDI already exists, or wants to find the Nature NIDI they need online, they can select Nature NIDI via the N-Score score system, accessibility, species type, and habitat type in the map interface.



Figure. 10. Nature NIDI APP User Interface (by author)

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