

# Implementation of strategic design in sustainable landscape development

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This paper explores the implementation of strategic design in sustainable landscape development through a case study of the Neckar Landscape Park Student Competition. Drawing upon previous research on sustainable land use development, the study emphasizes the importance of integrated approaches and transdisciplinary thinking in managing landscapes. The strategic design process, characterized by analysis, synthesis and evaluation, is applied to address the socio-ecological and spatial challenges of the Neckar river valley. The findings highlight the potential of strategic design to create resilient and sustainable landscapes by combining scientific analysis and imaginative problem-solving. The case study exemplifies the value of strategic design in landscape architecture and offers insights for future landscape management.

**Keywords:** strategic design, landscape development, sustainable development, student competition

## 1 Introduction

As defined by the European Landscape Convention, landscape is “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” (Council of Europe, 2000). Current socio-ecological issues necessitate a rethinking and redesigning of landscapes to enhance their resilience and sustainability. Two decades ago, Wiggering et al. (2003) emphasized that sustainable land use development will play a vital role in future landscape management, highlighting the need to identify its multiple functions within the environment, society, and economy (Wiggering et al., 2003). What makes multi-functional landscapes sustainable is their ability to use up space efficiently and fulfil the needs of diverse users, which grants them lasting support (Kato & Ahern, 2009).

Sustainable landscape development, as described by Stauffacher and Krütli (2016), can only be understood and managed through integrated approaches, since it is transdisciplinary and covers both urban and rural areas across multiple scales (Stauffacher & Krütli, 2016). Löfgren et al. (2018) stated that long-term development

of a region is determined on a strategic level, because even small interventions on individual sites can have a substantial cumulative influence on the wider area. Such impact may only be evident through environmental and landscape assessments on a regional level (Löfgren et al., 2018) and therefore a detailed research of the plan area is crucial. Understanding the context and the broader surroundings of the site, but also combining and altering existing ideas have influence on the final outcome of the planning process (Vlug, 2013a). This approach can be defined as strategic design, which is an evidence-based practice influenced by the social aspect (Caliskan & Wade, 2022).

Vlug (2013b) established a connection between design and strategy, stating that “design means making choices at the right moment and monitoring progress in a strategic way, while at the same time having to communicate, present, persuade and produce” (Vlug, 2013b). Strategy is therefore an effective tool that can be utilized by landscape architects and designers to make the most of a situation and to achieve the desired result (Bafarasat, 2022). Strategic design, also referred

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to as design process or design thinking, encompasses four practice sets: research, ideation, prototyping and testing, combining scientific and imaginative approaches, in order to solve problems both creatively and pragmatically (Caliskan & Wade, 2022).

According to Caliskan and Wade (2022), practitioners of strategic design are expected to possess collaborative, empathetic, and optimistic qualities, while also demonstrating integrated thinking and experimentalism (Caliskan & Wade, 2022). Additionally, they should be able to anticipate future human behaviours (Schwartz et al., 2023).

The necessity of strategic design can be exemplified by the field of transport planning, where the wide-ranging effects of infrastructure construction on landscapes must be considered. Construction of roads and railroads affects landscape both directly through taking up land and indirectly through air, water and noise pollution. It also negatively affects the connectivity of the land matrix. Moreover, improved accessibility changes the socio-economic situation of the area leading to new housing and industries, which may cause increased land built-up (Löfgren et al., 2018).

Another application of strategic design is the planning of green infrastructure, which is a network of natural and semi-natural spaces that offer a wide range of ecosystem services across Europe (Halajová & Halaj, 2020). According to Tóth (2018) the incorporation of green infrastructure in landscape design proposals should be based around functionality and sustainability and supported by relevant research, as well as by transfer of knowledge between researchers, practitioners and legislators (Tóth, 2018). In urban regions, on the other hand, strategic spatial planning is often employed in response to social and economic changes, but also as one of the key guidelines towards sustainable metropolitan development. For instance, former industrial centres can be transformed into service-oriented urban areas (Hersperger et al., 2020).

### **1.1 Investigating possibilities to implement strategic design in sustainable landscape development**

The goal of this paper is to investigate possibilities to implement strategic design in sustainable landscape development by example of the Neckar Landscape Park Student Competition organised by the Le:Notre institute in 2023. Our international and interdisciplinary team of seven bachelor students with backgrounds in landscape architecture and design, urban design, and sustainable agriculture and rural development, submitted an entry titled “Riverscape Renaissance”. The project was developed during the Strategic Design module at Van

Hall Larenstein University of Applied Sciences (VHL) in the Netherlands, under the guidance of Adrian Noortman, Dick van Dorp, and Daniel Irving. The key questions related to strategic design that our team perceived were: Where and how should we conduct research? How should we utilise our findings within the design? How can we be creative but still pragmatic?

## **2 Material and methods**

The strategic design module at VHL is a studio-based course with a workshop-like character and does not include theoretical classes. The basic approach to design process at VHL is cyclical and involves analysis, synthesis and evaluation (Vlug, 2013a) and the basic principle of the Strategic Design course is “learning by doing” (Vlug, 2013b). Vlug (2013b) also argues that students at VHL are expected to integrate landscape-related, urban planning, recreational and ecological features into their master plan (Vlug, 2013b). De Vries (2013) further emphasizes that students at VHL should aim to connect and harmonize their designs with the surrounding context (De Vries, 2013).

The working process was only loosely structured with approximately 8 hours of guidance from lecturers every week. Additional support from GIS and graphic design experts was provided once a week. Our team thus had the flexibility to organize our time according to our needs, and we mainly preferred meeting in person from 9 a.m. to 5 p.m. daily. We also engaged in individual work during evenings, weekends, and winter break. Each team member dedicated approximately 420 working hours to the project. We held weekly presentations where we showed off our progress and received feedback. The strategic design process consisted of two parts: research and design. The whole process spanned 9 weeks from November 14<sup>th</sup> 2022 to January 27<sup>th</sup> 2023.

### **2.1 Design orientated research**

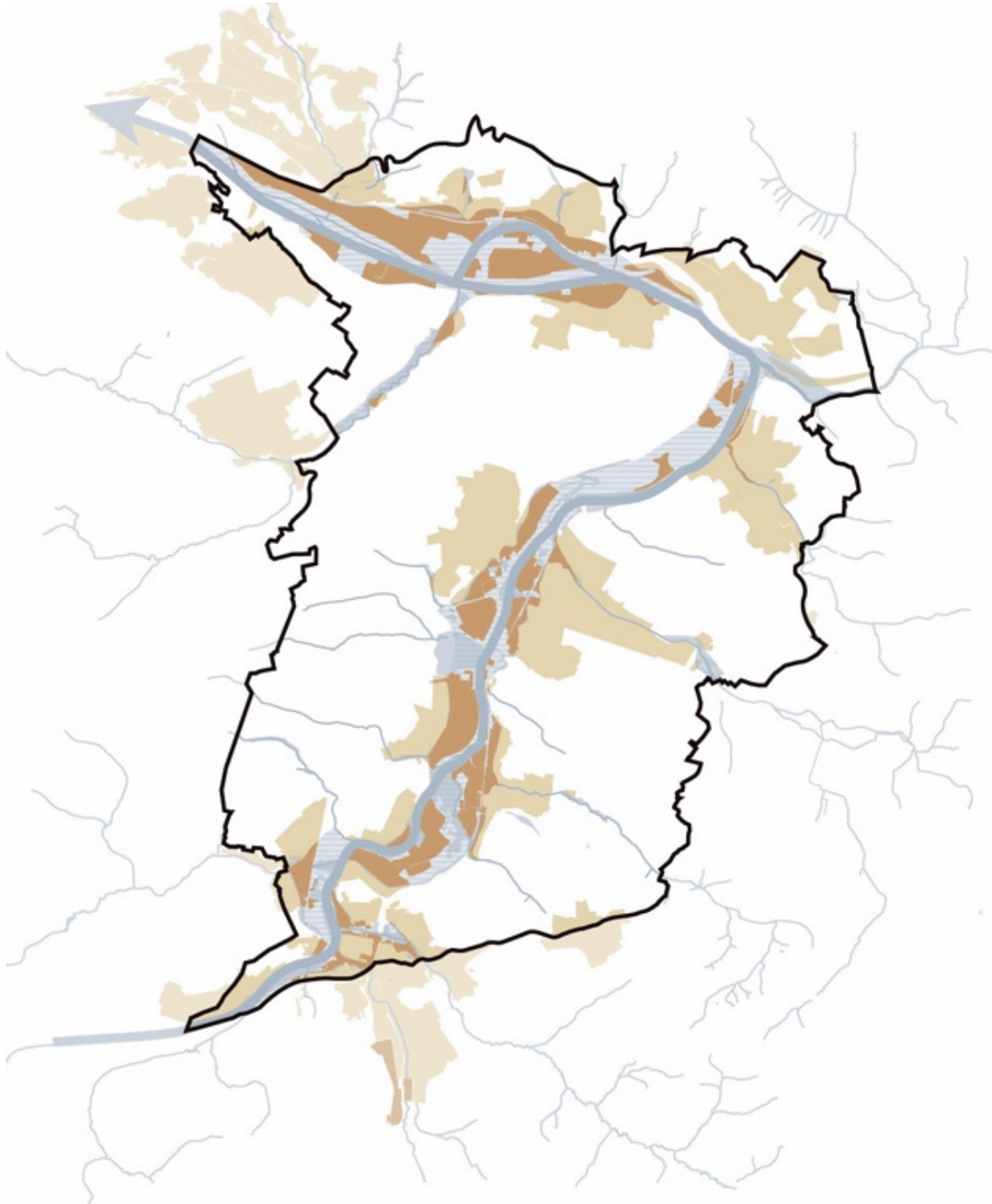
The method used in our project, also known as research by design, involves using design as a tool in the planning process (Back Prochnow & Čibik, 2022). According to Vlug (2013b) students of VHL are encouraged to base their vision on design-led research and apply their theoretical knowledge, skills and interests to the proposed concept (Vlug, 2013b).

Before starting the project, we attended lectures given by the competition organizers, which familiarized us with the Neckar river valley and its challenges. Our research was transdisciplinary and done across multiple scales. The advantages of a multi-disciplinary team began to emerge early on as the existing knowledge within the group eased the research process. The research primarily

involved studying and analysing maps using GIS tools as seen in Figure 1.

However, we also utilised tools such as Geoportal.de, Google maps, and the materials provided by the competition organizers. On top of that, we extensively searched the Internet and accessed online literature for relevant information. Furthermore, the lecturers organised an excursion to the Stuttgart region in the

second week of the research process, which provided the opportunity to make first-hand observations and photo documentation and engage with the local stakeholders. Consequent DPSIR Analysis, based on a lecture on this method given by Dr. Ellen Fetzer on November 28<sup>th</sup> 2022, identified the existing pressures and drivers in the area and provided potential responses. As the research phase progressed, a vision of the future design started to develop



**Figure 1** A map of flood prone urban areas produced during the research phase

Social division	Energy	Fragmentation
Complete social justice	Only renewable energy	Natural landscape and urbanised environment function as one ecosystem. Excellent infrastructure for cyclists, pedestrians, public transport
Some social injustices	Mainly renewable energy	Well-connected landscape with good infrastructure for cyclists, pedestrians, public transport
Growing poverty and division between those with and without means	Half of the energy consumed comes from renewable sources	Slightly fragmented landscape with infrastructure oriented towards cars
Social divisions between classes	Energy mainly from fossil fuels	Fragmented landscape, mainly dominated by human activity with little possibility for people to interact with it
Lots of poverty	Energy only from fossil fuels	Fragmented human-dominated landscape, no interaction between towns and natural landscape
Solid walls between social classes	Energy only from fossil fuels	Fragmented human-dominated landscape, no interaction between towns and natural landscape
Biodiversity	Agriculture	Water
High biodiversity and healthy ecosystems	Sustainable and climate-proof food production, agriculture enhances natural habitats, diet consists of local produce	Clean and safe water filled with local fish, river floods but does not cause any problems because the landscape is adapted to it
Ecosystems are slightly imbalanced	Agriculture not infringing on natural habitats, local agricultural produce preferred, soil degradation minimised	Safe water with local fish, landscape is not completely adapted to river floods but causes problems only once in 100 years
Ecosystems are slightly imbalanced, humans are disconnected from the natural landscape	Agriculture infringing on natural habitats, soil is degrading through erosion	Safe water, parts of the river canalised, river can flood regularly in specific places, this causes problems every 75 years
Damaged ecosystems and habitat loss	Agriculture destroying natural habitats, most of agricultural produce is imported, soil is degrading	Polluted water with very little aquatic life, river canalised but overflows every 50 years causing major damage
Degradation of the landscape and natural ecosystems	Agricultural products imported from around the globe, products from the region exported, soil degraded, groundwater polluted	Heavily polluted water with no aquatic life, extensively canalised river which overflows every 10 years causing major damage

**Figure 2** Ecological deprivation index identifying various scenarios in social division, energy, fragmentation, biodiversity, agriculture and water

and this guided our subsequent analysis. We defined six main research topics using the Ecological deprivation index as seen in Figure 2. These were later consolidated into three pillar topics: land management, water system, and energy. The research part took place primarily, in the initial third of the project timeline, but additional research was conducted throughout the design phase to support new ideas with factual information.

## 2.2 Research based design

The vision for the future of the Stuttgart region began to take shape in the last days of the research phase. The design phase involved extensive brainstorming and consultations with the lecturers, leading to the

identification of main challenges that spanned across the previously mentioned three pillar topics. These challenges were further broken down into specific interventions, which served as the foundation for the Master plan (refer to Figure 3) and later the Elaboration plan.

Numerous iterations of the Master plan and Elaboration area were developed through collaborative sketching sessions, where each team member contributed their ideas (refer to Figure 4). Eventually, these individual plans were merged to create the final posters.

Throughout the design process, our team maintained a focus on balancing innovation and practicality in the proposed plans. In the later stages of the design phase,

## Solutions

### Energy

-  The industry will only provide renewable energy. The stations are a smaller scale. People don't experience exiled land reserved for industry.
-  Local biomass stations provides heating for neighborhoods. People can eliminate forms of fossil energy
-  Agrovoltatics provide local solar energy combined with growing crops.
-  Hydropower stations generate renewable energy. Flexibility in use changes fish habitats and winter energy production.

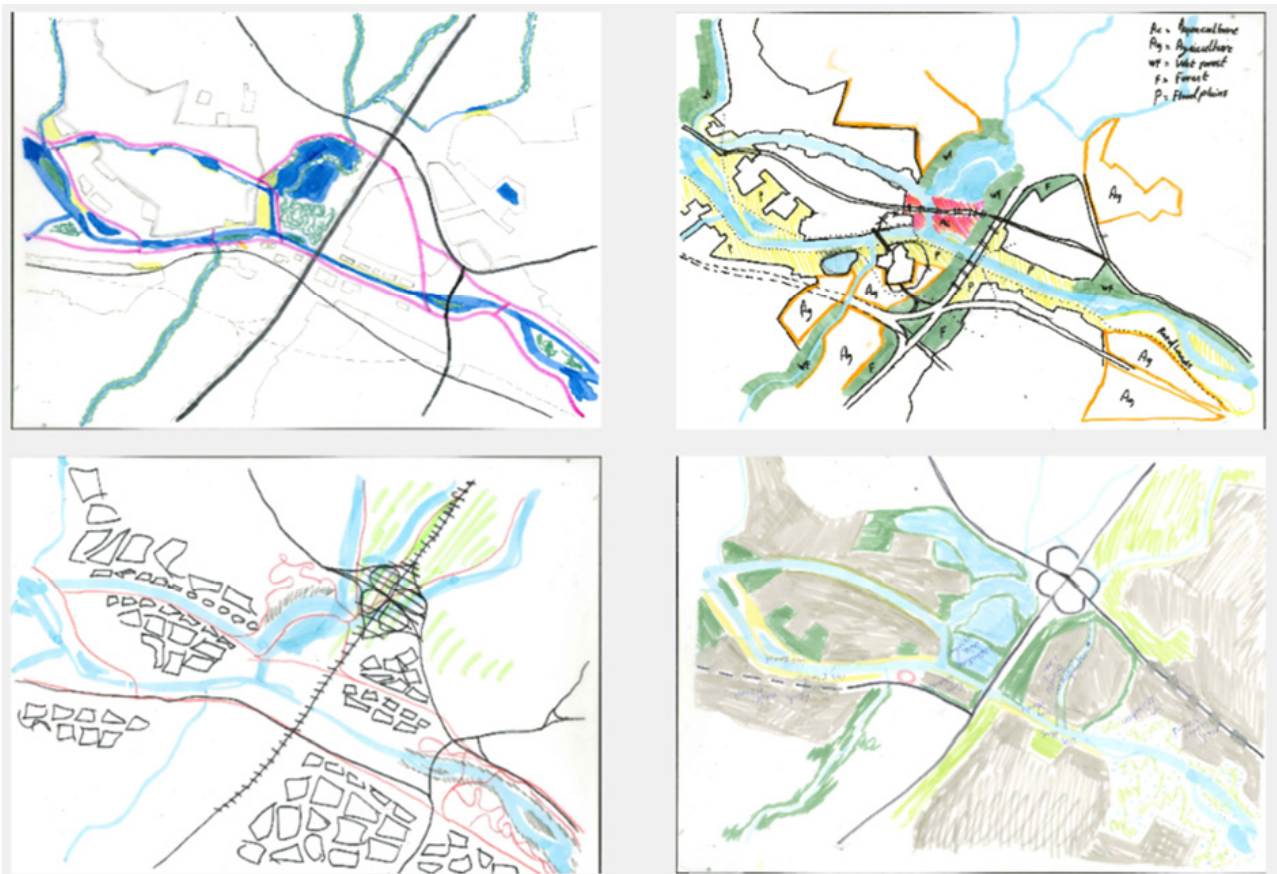
### Water system

-  Fish bypasses allow fish migration, even though a hydropower plant is operating in the same stream.
-  A place for leisure at the waterfront and wetlands to enjoy the surrounding nature offers.
-  Wetlands, where flora and fauna can help to improve quality of life and water. Where people can re-connect with nature.
-  Properly filtered sewage systems to improve flora and fauna, and slowly allows more water recreation
-  Rainwater retention ponds for irrigation to overcome drought-season and strengthen green structures

### Land management

-  Agroforestry combines a robust greenstructure with a production landscape.
-  Compact living saves valuable outdoor areas for more public space.
-  Variations in landscape means a more resilient landscape and more experiences
-  Adding bike infrastructure gives more transport options besides car dependency
-  Urban multi-use areas intertwine living, working and leisure in one landscape.
-  Forming stronger creek structures for ecological corridors and cooling in urban areas
-  Gateways from the creeks uphill to urban area to make connection with the Neckar and its valley.

**Figure 3** Solutions proposed in the Master plan



**Figure 4** Products of a collaborative sketching session

we fully applied the principles of Strategic Design while working on the Strategy poster. This involved placing the proposed interventions on a timeline and finalizing a step-by-step sustainable development plan of the Neckar river valley in the Stuttgart region, Germany, over the next 50 years.

### 3 Results and discussion

The final outcome of the strategic design process consisted of four posters presenting the design proposal titled “Riverscape Renaissance”. This proposal aimed to achieve a gradual revival of the Neckar river landscape through carefully planned interventions in the areas of energy, land management, and water system.

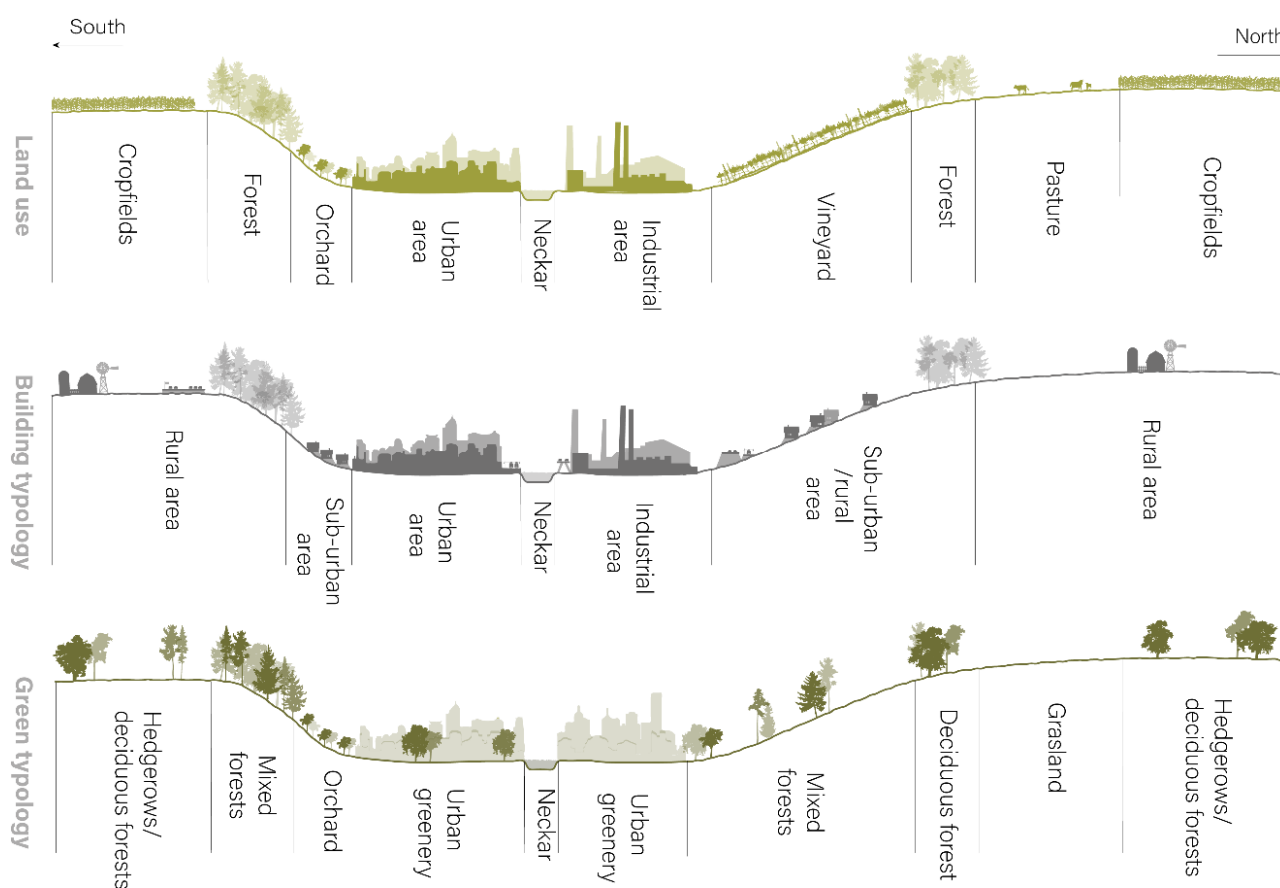
#### 3.1 Site analysis

The first poster focused on identifying and addressing key issues in the Neckar valley. One of the prominent issues we observed was the presence of harsh borders in the landscape caused by industrial and urban development, leading to fragmentation of green corridors. Through

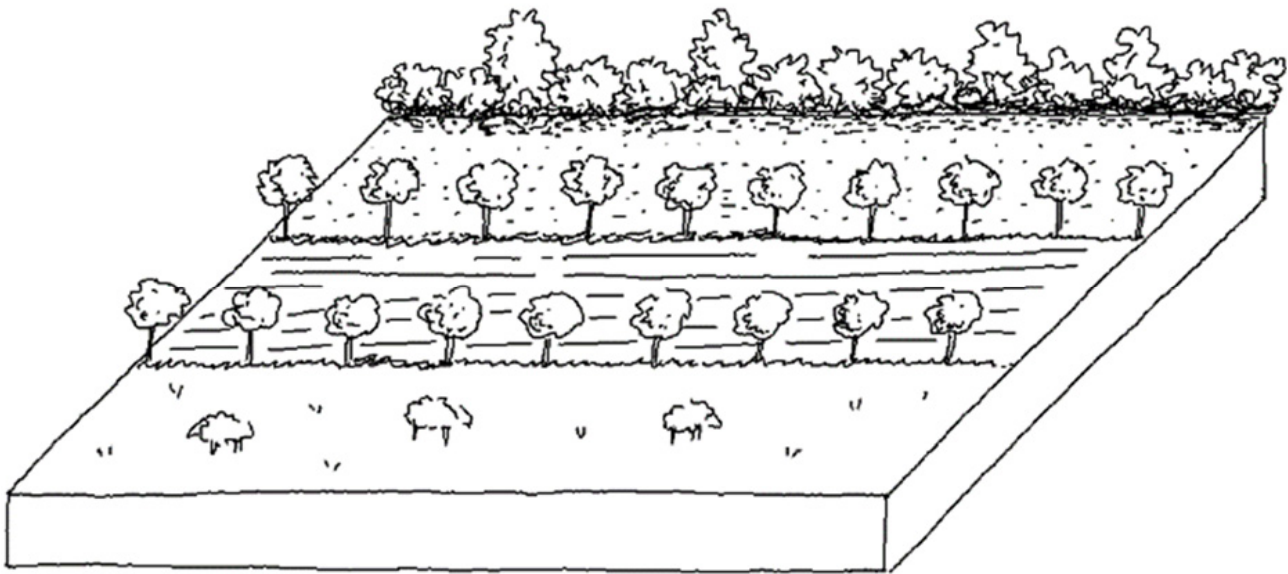
spatial analysis, we discovered that the density of settlements and therefore also the fragmentation of the land matrix increased as we approached the river (refer to Figure 5). Other identified issues included the vulnerability of built-up areas to flooding, the region’s reliance on fossil fuels, neglect of Neckar’s tributaries, poor water quality in the river, and soil erosion.

#### 3.2 Master plan

Our design proposal focused on the three main pillars for a gradual and sustainable landscape revival. We aimed to minimize environmental impact while meeting energy demand, improve land management through diverse agricultural practices and green corridors (refer to Figure 6), and enhance the water system by creating space for the river and improving aquatic habitats. Our design aimed to make the riverscape productive, accessible, and visually appealing while restoring the Neckar River as the prominent feature of the landscape.



**Figure 5** Spatial typology of the Neckar valley



**Figure 6** A sketch of an agroforestry system – one of the agricultural practices proposed for the area

### 3.3 Elaboration

The elaboration poster focuses on transforming our ideas into more specific design proposals. We selected the Neckar Spinnerei site, located centrally within the Neckar river valley, as it serves as a representative example of the entire region. The poster presents two scenarios: low water and high water (refer to Figure 7), demonstrating how the landscape adjusts to flooding.

### 3.4 Strategy

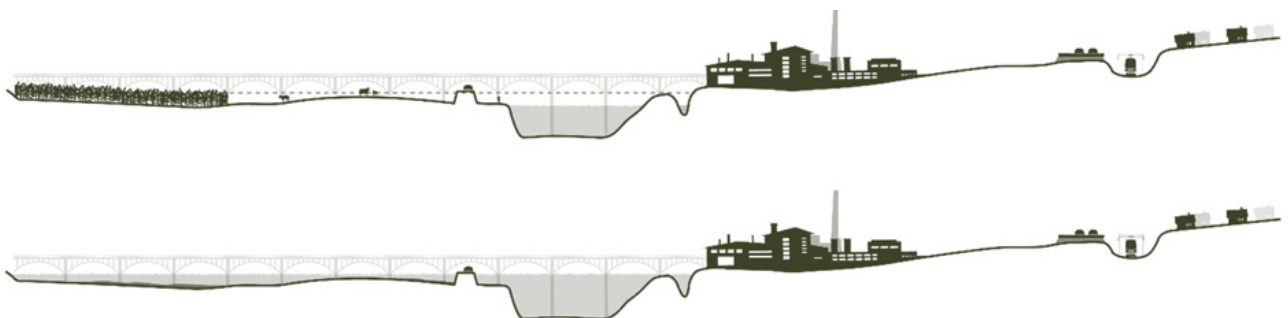
The strategy poster is organized as a timeline covering the next 50 years (refer to Figure 8). It outlines the projected transformative impacts of the proposed design interventions and establishes connections with subsequent actions. Additionally, strategic investments, such as financial support, ecological services, and engagement from local stakeholders, are incorporated into the plan.

### 3.5 Afterthoughts

De Vries (2013) argues that the design process at VHL is almost too efficient and leaves little room for reflection (De Vries, 2013). We share this sentiment as we felt the planning process to be very fast paced. However, this approach helped us meet the competition deadline and even provided some leeway towards the end to refine certain aspects of the design.

## 4 Conclusions

In conclusion, this paper explores the concept of strategic design and its application in sustainable landscape development in the context of a student project, with a focus on the design process. It emphasizes the need for integrated approaches, transdisciplinary thinking, and evidence-based practices in designing future-proof landscapes. The case study of the Neckar Landscape Park Student Competition provides insights into the strategic design process. Through research and analysis our team



**Figure 7** Low and high water scenarios at the Neckar spinnerei



**Figure 8** The strategy poster  
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leveraged strategic thinking, collaboration, and creativity to develop practical solutions to the key challenges identified in the region.

Overall, the strategic design approach applied in the case study demonstrates the potential for creating sustainable and resilient landscapes through a combination of research, creativity, and pragmatic problem-solving. By applying strategic design principles, landscape architects and designers can contribute to the creation of resilient and vibrant landscapes that meet the needs of diverse users thus ensuring long-term sustainability.

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