



Yunnan Astral ESG Investment CO., Ltd (ASTRAL)

Business Context

ASTRAL ESG is an investment company active in agri-food systems. They work directly with local farmers and indigenous communities, buying food from them. The company is based in Yunnan, China's most biodiverse, and most ethnically diverse, province. Working in this unique landscape context motivated ASTRAL to identify where their activities create impacts or rely on specific dependencies, such as biodiversity preservation and cultural diversity.

The protection of biological and cultural diversity lie at the heart of Astral Food's mission. Inspired by the ancient Chinese philosophy of "Unity of man and nature," the company seeks to create harmonious coexistence between humanity and the environment.

In 2021, ASTRAL jointly launched the "International Demonstration Zone for Sustainable Human Settlements with Cultural and Biological Diversity" in Yunnan Province, China, covering an area of 1,350mu¹. The demonstration zone has biodiversity and natural capital restoration at its core. The project's aims are to:

- Promote the restoration of multiple contiguous ecosystems and their soils.
- Advance a more sustainable and ecologically balanced approach to food production by moving away from monocultures towards greater species diversity and improved ecosystem resilience.
- Create productive agricultural landscapes that function as rejuvenated ecosystems, resembling flourishing gardens where practicality and ecological aesthetics are equally emphasised.

ASTRAL maintains a steadfast commitment to prioritizing species conservation. By 2030, they aim to protect a diverse array of biodiversity in their project site, drawing from their project implementation experience to ensure an effective conservation strategy. Utilising their project library as a valuable tool and emphasizing equitable sharing of biogenetic resources, they aim to establish an action standard for the preservation of biodiversity in food production.

Assessment

WHY? What was the objective of the assessment?

¹ Mu is a unit of area measurement used in China. It corresponds to 1/15 of a hectare, or about 666.67 m².



ASTRAL decided to conduct a natural capital assessment to better understand and value their positive impact on biodiversity and natural capital and to contribute to a more comprehensive account of their ecological assets.

The objective of the assessment is to quantify enhanced natural capital in the Demonstration Zone and prove the value of ASTRAL’s regenerative soil strategy to both investors and consumers. Soil regeneration will help support the transition to low-carbon agriculture, mitigate nature loss and preserve biodiversity, all of which are increasingly important for investors. At the same time, consumers can be educated on the importance of biodiversity, as well as the agricultural techniques and products that do not cause it harm.

WHAT? What was the scope of the assessment?

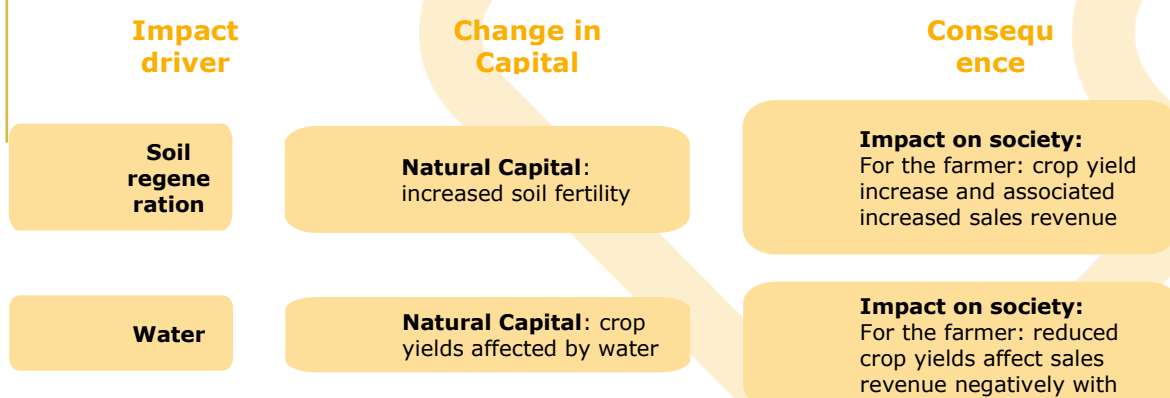
ASTRAL opted to focus their assessment on the Demonstration Zone project in Yunnan Province, China - a Zone covering an area of 1,350mu. An overall long term natural capital assessment will run from 2021 - 2030. An assessment of the initial 3 years has also been undertaken, the results of which are reported here.

The assessment methodology includes qualitative, quantitative and monetary components, and is based on a 1000mu sample spatial boundary. Results will be collected annually until the end of the project in 2030, when ASTRAL expects to have accounted for natural capital of 60,000mu of farmland.

HOW? What was measured and valued?

The materiality assessment carried out by ASTRAL identified four main impact drivers, namely: Soil regeneration, water availability, germplasm (genes) and climate.

The following impact pathways were developed relating to soil regeneration and water availability – which have been the main aspects evaluated in the study so far.



The natural capital assessment comprises two core components:



1. An estimation of the change in natural capital, based on an assessment of improved soil fertility and water availability.
2. A cost/benefit analysis of the project's associated impact on agricultural output (productivity) and income to the farmers from sales (revenue).

Results on both components will be collected annually and compared with results from a baseline assessment that was conducted prior to operations.

In its vision scenarios, ASTRAL anticipated that after the soil restoration strategy had been implemented, soil fertility would continue to improve, leading to decreased soil restoration costs and increased crop yields. Moreover, with the soil having been restored to an organic condition, they predicted that sales revenues would increase due to the additional agricultural product quality assurance that this would enable. Investigations into the value of genetic material and associated with climate change will be undertaken in the coming years. The former relates to protecting old varieties and declaring intellectual property rights over new varieties.

While the aim is to complete the assessment over a 10 year period, some initial assessment results have been established for the first three years of the project (2021 – 2023) which are summarised in the table below.

Impacts associated with the first three years of the project (2021 – 2023)

COST	Total cost (1,000mu sample)	Output value per mu	Income from sales of agricultural products per mu	Natural capital growth
Fixed input: 10,000 yuan/mu	10,000,000 Yuan	3,000 Yuan	5,000 Yuan	
First year: Additional input of 7,000 yuan/mu for soil regeneration.	7,000,000 Yuan	8,000 Yuan	16,000 Yuan	68%
Second year: Additional input of 6,000 yuan/mu for soil regeneration.	6,000,000 Yuan	8,800 Yuan	17,600 Yuan	71%
Third year: Increased water demand due to drought led to additional input of 7,000 yuan/mu.	7,000,000 Yuan	6,000 Yuan	12,000 Yuan	58%

The initial input costs per mu of agricultural land in the demonstration zone was 10,000 Yuan, giving a total cost of 10,000,000 Yuan across the entire 1,000mu



sample study. In this initial 'baseline' situation, the output value per mu was 3,000 Yuan/year, producing 5,000 yuan per year in sales income.

The results from the first year of operations highlight the positive impacts for both farmers and ecosystems that ASTRAL's soil regeneration strategy produce. Additional input costs from the soil regeneration amounted to 7,000 Yuan/mu, but the positive return on this investment was significant. Soil regeneration enabled output per mu for the year to more than double to 8,000 Yuan. Moreover, the benefit of being able to sell the products as 'organic' more than tripled sales income to 16,000 Yuan/mu. The natural capital soil fertility assessment measured an increase of 68% above the baseline, which it can be assumed also led to knock-on benefits in biodiversity and ecosystem condition.

In the second year, the costs associated with soil regeneration were lower, at 6,000 Yuan per mu (6,000,000 Yuan across the entire study area). Both output value and sales income increased by a more modest 10%, to 8,800 Yuan and 17,600 Yuan respectively per mu. As a result of these gains, ASTRAL's soil regeneration strategy was able to transform an economically unproductive site into one that generates an operating profit of 600 Yuan per mu (600,000 across the entire study area). Soil fertility (natural capital) also increased to 71% above the baseline.

In the third year, a severe drought affected the Yunnan province. Linked to global climate change and the record-breaking global temperatures that were experienced in 2023, rainfall in Yunnan province fell well below average, leading to increased water requirements in the ASTRAL Demonstration Zone. In the Study Area, this increased input costs by 7,000 Yuan per mu. In addition, the unusually high temperatures and dry weather conditions negatively impacted farm productivity, causing the output value to fall to 6,000 Yuan/mu, and sales income to 12,000 Yuan/mu. This was linked to the associated decline in soil fertility (natural capital), which fell to 58% above the baseline.

WHAT NEXT? What were the results of the assessment?

In relation to ASTRAL's objectives for their natural capital assessment, the key takeaways from the results so far include:

- ASTRAL's soil regeneration strategy produces tangible results to both farm productivity and natural capital condition, and this can be communicated to target further investment.
- Natural capital risks and opportunities have a significant impact on the food and agricultural system. The opportunity to invest in soil remediation led to increased benefits for both nature and society. At the same time, the risks associated with global climate change halted progress and are forecasted to worsen.



- The destruction of ecosystems brought on by global climate change and associated severe weather events has dealt a huge blow to agriculture. ASTRAL anticipate soil fertility to continue to decline year after year.

Overall, ASTRAL found that the TEEB Agrifood natural capital assessment framework complements ESG investment guidelines and helps identify quality projects that contribute to biodiversity conservation.

ASTRAL plan to share these learnings and conclusions with scientists, farmers, and consumers through exchange meetings on high quality ecological products and project libraries, as well as through product launch.

Learn more about ASTRAL [here](#).