THE ALMOND VALLEY

Instructions

This case study presents a complex and realistic situation, dealing with the issue of "what's sustainability"? The goal is to develop your skills in critical analysis, argumentation, and understanding different points of view. Please read the entire case carefully individually, then discuss it with others (in groups of 3 or 5) and complete the worksheet. Finally, each group will report on the points that emerged in the final discussion.

1. The Territory

Val Riduna is a small valley in the hilly region of Friuli, in northeastern Italy. It is located between the first slopes of the Julian Pre-Alps. The valley includes three municipalities – Riduna, San Floriano and Castelnovo – with a total population of about 4,500 people. This number has been steadily decreasing since the 1960s. The landscape consists of gentle hills covered with vineyards, almond and cherry trees, and higher slopes with chestnut and beech forests.

The local economy is based on a fragile balance. Agriculture is divided into small properties, often managed by elderly people. The area produces decent quality wines that are not well-known outside the region, locally famous honey, and most importantly, almonds. The local variety, called "Mandorla della Riduna" (Riduna Almond), has a particularly strong flavour and blooms very early. It has been a Slow Food Presidium since 2012. Two small workshops transform the almonds into amaretti biscuits, crunchy sweets and almond oil. These products are sold mainly through local tourism and regional markets.

Over the past twenty years, the valley has developed a modest tourist economy. It is based on food and wine tourism, cycling, and especially the "Almond Blossom Festival". Every year, between late February and early March, thousands of visitors come to admire the hills covered with white and pink flowers. This event has become the symbol of the valley. It appears on postcards, wine labels, and agritourism logos.

But the almond blossom depends entirely on bees. And the bees of Val Riduna are dying.

2. The Crisis

Silvano Mosetti, 67 years old, has been a beekeeper since he was fifteen. His father and grandfather were beekeepers before him. He manages 180 hives spread across the valley hills. He moves them according to the flowering seasons – acacia in spring, chestnut in summer, ivy in autumn. His almond

honey, produced during the early February-March flowering, is considered a rare delicacy.

"In the winter of 2019, I lost 40% of my bees," he says. "The following winter, 55%. Last year, almost 70%. This year I am left with 50 hives, maybe less. In fifty years, I have never seen anything like this."

Silvano is not alone. The other three beekeepers in the valley – all part-time, with 20-40 hives each – report similar losses. The problem is not limited to Val Riduna. Throughout the Friuli Venezia Giulia region, beekeeping associations are reporting unprecedented deaths. But the problem is particularly severe in the valley.

The causes are the subject of heated discussion. Silvano points to the pesticides used in the vineyards of the neighbouring plain – particularly neonicotinoids. These were banned by the EU in 2018 for flowering crops but are still allowed for some uses. "The wind carries everything up here," he says. "And the bees go everywhere to collect nectar. They don't know about municipal borders."

The Regional Environmental Agency has analysed samples of dead bees. The results are unclear: traces of pesticides are present, but below levels considered lethal. Technicians from ERSA (the Regional Agency for Agricultural Development) suggest a combination of factors: the Varroa mite, which is more aggressive due to mild winters; climate change that disrupts the timing of flowering compared to bee cycles; habitat fragmentation; and possibly viruses and pathogens that are not yet well understood.

Whatever the cause, the effect is visible: the 2024 almond blossom was a failure. Without pollination, the trees produced few, malformed fruits. The harvest was 70% below average. The two processing workshops had to supplement with Sicilian almonds – losing their Slow Food certification for those batches. Tourism for the blossom festival continued, unaware, but some visitors noticed that something was wrong: fewer bees on the flowers, an unnatural silence.

3. The Offer

It is in this context that, in April 2024, Marta Cecconi, the mayor of Riduna, receives an unexpected phone call. On the other end is Elena Nordio, 38 years old. Elena was born in Riduna but left twenty years ago to study robotics engineering in Padua, then in Zurich, and then at Carnegie Mellon in the United States. She now directs the applied research department of AgriDrone Solutions, an Italian-Swiss startup specialising in agricultural robotics, with headquarters in Lugano and laboratories in Trento.

Elena heard about the valley's crisis from her parents, who still live there. She has an idea, and she has convinced her investors to listen.

"We have developed a system of micro-drones for precision pollination," she explains to Marta during their first meeting a month later. "We call them PolliBot. They are the size of a large bee, they work independently, and they

are coordinated by artificial intelligence. They can pollinate one hectare of orchard in a few hours, with greater efficiency than natural bees."

Elena shows videos, data, and scientific publications. The system has been successfully tested in greenhouses in the Netherlands and in almond orchards in California. But there has not yet been an open-field experiment in European climate conditions, on traditional crops. Val Riduna would be the perfect site.

"We are not asking anything from the municipalities," Elena explains. "AgriDrone would cover all the costs of the experiment. In fact, we are offering €50,000 to the Producers' Consortium to compensate for this year's losses. And if the project works, pollination would be free for the first three years. Then we would discuss commercial terms."

Marta is shaken. On one hand, the situation is desperate: without a solution, almond cultivation in the valley might not survive. On the other hand, something makes her uncomfortable. She asks for time to consult the community.

"I understand," Elena replies. "But we don't have much time. We need to decide by September if we want to be ready for the February flowering. And we have other options: the Emilia-Romagna Region has offered us an alternative site."

4. A Divided Community

In the following months, the AgriDrone proposal becomes the main topic in the valley's life. Opinions quickly become polarised.

Those in Favour

Marco Visintin, 52 years old, is the president of the Riduna Almond Producers' Consortium. He is the most convinced supporter of the project. He manages 8 hectares of almond orchards, the largest in the valley. He inherited them from his father and expanded them in the 1990s when the area seemed ready for a revival. He has invested everything in almonds: he built a small processing plant, obtained organic certification, and worked for Slow Food recognition.

"This year I lost €180,000," he says during the public meeting called by the municipality in June. "Next year, if it continues like this, I will close. And with me, the five employees of the workshop will lose their jobs, plus the two seasonal workers for the harvest, the accountant, the transport company. We are not talking about romantic ideas here: we are talking about survival."

Marco is supported by most of the agricultural producers – especially the younger ones, those who have tried to make agriculture a real economic activity and not just a hobby for retirees. He is also supported by the Riduna shopkeepers' association, which is worried about the effects on tourism.

Giulia Tomasi, 34 years old, runs the agritourism "Al Mandorlo Fiorito" with her husband. She has two small children and returned to the valley after

years in Milan precisely to give them "a different life". She is divided, but in the end she sides with Marco.

"It's not the ideal solution, I know. But if we do nothing, in five years there will be nothing left here. The drones at least give us time – time to find better solutions, to understand what is killing the bees, to adapt. We cannot wait for the world to become perfect while the valley dies."

Those Against

Silvano Mosetti, the beekeeper, is furious. For him, the proposal is an insult – to his profession, to his family, to nature itself.

"Instead of asking why the bees are dying, instead of doing something about the causes, they propose to replace them with toys. And who benefits? A Swiss multinational. Not the farmers, not the beekeepers, not the valley. Them."

Silvano has done research. He has talked to beekeeping associations across Italy. He has contacted university researchers. He discovered that pollinating drones have significant limitations: they only work in optimal weather conditions (not with wind, not with rain); they require detailed mapping of the orchards; they do not produce honey or other hive products; and above all – he argues – they will normalise the death of bees.

"If the almonds are pollinated by drones, who will care about the bees? In ten years there will be no more bees, and we will all depend on a private company to make our fruits grow. Is this the future we want?"

Father Luigi Ferraris, 71 years old, parish priest of San Floriano for forty years, unexpectedly enters the debate. During a Sunday homily in July – the church full for the patron saint's feast – he speaks about the "temptation of Prometheus".

"The Lord gave us the bees as He gave us the sun and the rain. They are part of creation, not a function to be optimised. When we think we can replace God's work with our machines, we sin through pride. The bee crisis is a sign: it asks us to change ourselves, not to change nature."

Father Luigi's sermon has a strong impact, especially among the elderly. But it also causes irritated reactions. Marco Visintin leaves the church in the middle of mass.

Teresa Paulin, 45 years old, is a biologist. She works for a regional environmental association and is originally from Castelnovo. She has returned to participate in the debate and brings a different perspective.

"The problem is not theological, it is political. The bees are dying because of precise choices: pesticides, monoculture, the industrial agricultural model. The drones do not solve anything: they move the problem, they create new dependencies, and meanwhile the causes remain. It's like giving aspirin to a cancer patient: it relieves the symptom while the tumour grows."

Those Who Are Uncertain

Mayor Marta Cecconi, 48 years old, a retired history teacher, cannot take a position. She was elected three years ago with a programme for the "sustainable revival" of the valley, and she feels she has disappointed everyone.

"I understand everyone's reasons," she confides to Elena Nordio during one of their many conversations. "Marco is right: if we do nothing, the valley dies. Silvano is right: if we accept the drones, we give up something important. Teresa is right: we should address the causes, not the symptoms. Father Luigi... well, Father Luigi speaks on another level. But I have to decide, and whatever I decide, I will hurt someone."

Roberto Nardini, 62 years old, a former regional official and now president of the Riduna Pro Loco (local tourism association), raises a different issue. "The Riduna Almond is a typical product, a Slow Food Presidium. Can it remain so if it is pollinated by robots? Will Slow Food accept it? Will tourists still come to the blossom festival knowing that drones fly under the flowers instead of bees? Maybe yes, maybe no. But we should at least ask ourselves."

5. New Elements

In July, as the debate intensifies, new elements emerge that further complicate the situation.

The Journalistic Investigation

A journalist from Messaggero Veneto, curious about the story, publishes an investigation into AgriDrone Solutions. He discovers that among the main financial backers of the startup is an investment fund controlled by Syngenta, one of the world's largest pesticide producers – including some neonicotinoids accused of contributing to bee deaths.

Elena Nordio, when asked, does not deny it. "It's true, Syngenta is among our investors. But this changes nothing: our drones work, regardless of who finances them. And it is not illegal, nor immoral, for a company to diversify its investments."

However, the news changes the tone of the debate. For some, it confirms their suspicions: the chemical industry first kills the bees, then sells the solution. For others, it is irrelevant: what matters is whether the drones work, not who produces them. For others still, it is a conspiracy theory oversimplification: Syngenta invests in hundreds of startups, it does not mean they control them.

The Alternative Proposal

Teresa Paulin, the biologist, presents an alternative plan to the municipal council. She has developed it with colleagues from the University of Udine and ISPRA (the national environmental protection institute).

The plan includes: creating ecological corridors for pollinators, with the planting of honey-producing hedges; a municipal ban on all pesticides suspected of harming bees (going beyond European regulations); economic

support for beekeepers to repopulate hives with more resistant bee varieties; political pressure on the Region and the EU for stricter regulations; and converting the neighbouring plain's vineyards to organic practices, through agreements with producers.

The plan costs about €800,000 over five years. The Region could cover half through European rural development funds; the rest would have to come from the municipalities and the Consortium. Results are not guaranteed and would not be immediate: it would take at least three to five years to see significant effects.

"It's a real solution," Teresa argues. "Not a patch. It requires time and money, but it addresses the causes. And above all, it doesn't make us dependent on anyone."

The Voice of the Young

At the end of July, a group of university students originally from the valley – most of them study elsewhere, in Trieste, Udine, Padua – organise a flash mob during the weekly market. They carry signs that say "Save the bees, don't buy them" and "Riduna without bees is not Riduna".

Chiara Mosetti, 23 years old, Silvano's granddaughter, studies environmental science in Padua. "We don't want to return to a valley-museum where everything is fake," she tells local journalists. "We want a real future. The drones are a shortcut that would take us in the wrong direction."

But not all young people think the same way. Matteo Visintin, 26 years old, Marco's son, studied agricultural economics and now works in the family business. "It's easy to talk about principles when you're not the one who risks losing everything. I want to stay in this valley, and I want my father's business to still exist in twenty years. If drones are needed for this, then let there be drones."

The Deadline

In mid-August, Elena Nordio formally communicates that AgriDrone needs an answer by 15 September. "It's not an ultimatum, it's a technical necessity. We need to prepare the drones, map the orchards, train the AI. If we don't start in September, we won't be ready for February. And at that point, our alternative site in Emilia-Romagna becomes the only option."

The mayor calls an open council meeting for 10 September. All residents will be able to speak. The final decision will be up to the council, but Marta knows she will have to propose something. She can no longer delay.

6. The Night Before

On the evening of 9 September, Marta walks alone among the almond orchards above Riduna. The sun is setting behind the Pre-Alps, and the orange light illuminates the bare trees – the harvest is long finished, this year there was little to harvest.

She thinks about her father, who cultivated these almonds when she was a child. She thinks about Elena Nordio, who left the same valley to conquer the world and has now returned with her machines. She thinks about Silvano and his dying bees. She thinks about Marco and his debts. She thinks about Teresa and her five-year plans. She thinks about Father Luigi and his Creator God.

Everyone is right. Everyone is wrong. Or perhaps the truth is that there is no solution that does not involve losses.

A message from Elena arrives on her phone: "Marta, I spoke again with my people. We can offer a compromise: experimentation only on half of the almond orchards, those whose owners voluntarily accept. The others remain with natural pollination – what's left of it. This way we can compare results. Is this an option?"

Is this an option? Maybe. Or maybe it's just a way to postpone the conflict. Sooner or later they will have to choose: either the bees or the drones. Either the radical transformation that Teresa proposes, with its costs and timing. Or surrender.

Marta sits on a dry stone wall, looks at the darkening sky, and tries to imagine what she would say to her father. What she would say to her children, if she had any. What she would say to the future generations who will inhabit – or will not inhabit – this valley.

Tomorrow she has to decide.

GUIDED ANALYSIS WORKSHEET

Case Study: The Almond Valley

How to Use This Worksheet

This worksheet will guide you through a systematic analysis of the case. Follow the steps in order: each step builds on the previous one. Fill in the spaces provided and use additional paper if needed.

Step 1: Understanding the Context

Before analysing, make sure you understand the basic facts.

1.1 The Territory

Geographical location	
Population and demographic trend	
Main economic activities	
Central identity element	

1.2 The Problem

What is the immediate problem?	
What quantitative data do we have?	
What causes are suggested?	
What consequences have already appeared?	

Step 2: Mapping the Actors

For each main actor, identify their position, interests and values.

Actor	Position on the case	Material interests	Values / principles
Marco Visintin			
Silvano Mosetti			
Teresa Paulin			
Father Luigi			
Elena Nordio			
Marta Cecconi			
The young people			

2.1 The Invisible Actors

Who has no voice in the debate but is involved? Complete:

Who?	Why? How?

Step 3: Analysing the Options

Three main options emerge in the case. Let us analyse them systematically.

Option A: Accept the AgriDrone Proposal

Expected benefits	**Risks and costs**
Who benefits?	**Who pays the costs?**

Option B: Teresa's Ecological Plan

Expected benefits	**Risks and costs**
Who benefits?	**Who pays the costs?**

Option C: Do Nothing / Wait

Possible benefits	**Risks and costs**

Is there an Option D? Try to formulate an alternative or a compromise:

Step 4. The Mayor's Dilemma

Marta faces an ethical dilemma. Try to state it clearly:

The dilemma is:

Which values are in conflict considering Marta's dilemma?

On one hand:	On the other hand: