# REGION DATASHEET FOR VULNERABILITY ANALYSIS

## 1. Context

**Study case: Swiss Jura**

**Value Chain name: Tête de Moine AOP**

**Land-use system name : Extensive open rangeland**

***Figure 1 Pastures in the Franches Montagnes region © FRIJ***

***Figure 2 Pasture located at 1000 m, at the time of the drought on 14 July 2015 (left) and shortly after the return of rains on 26 August 2015 (right)© AGROSCOPE Science | No 49 / 2017***

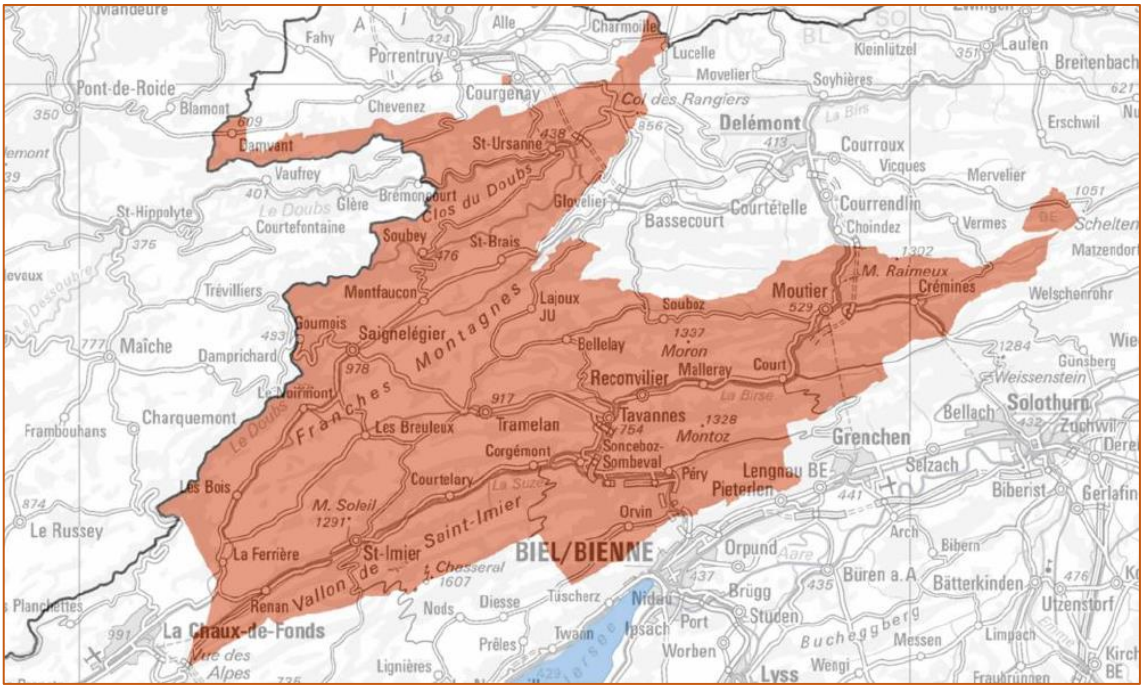


***Figure 3 The geographical area as defined in the specification of the PDO © FRIJ***

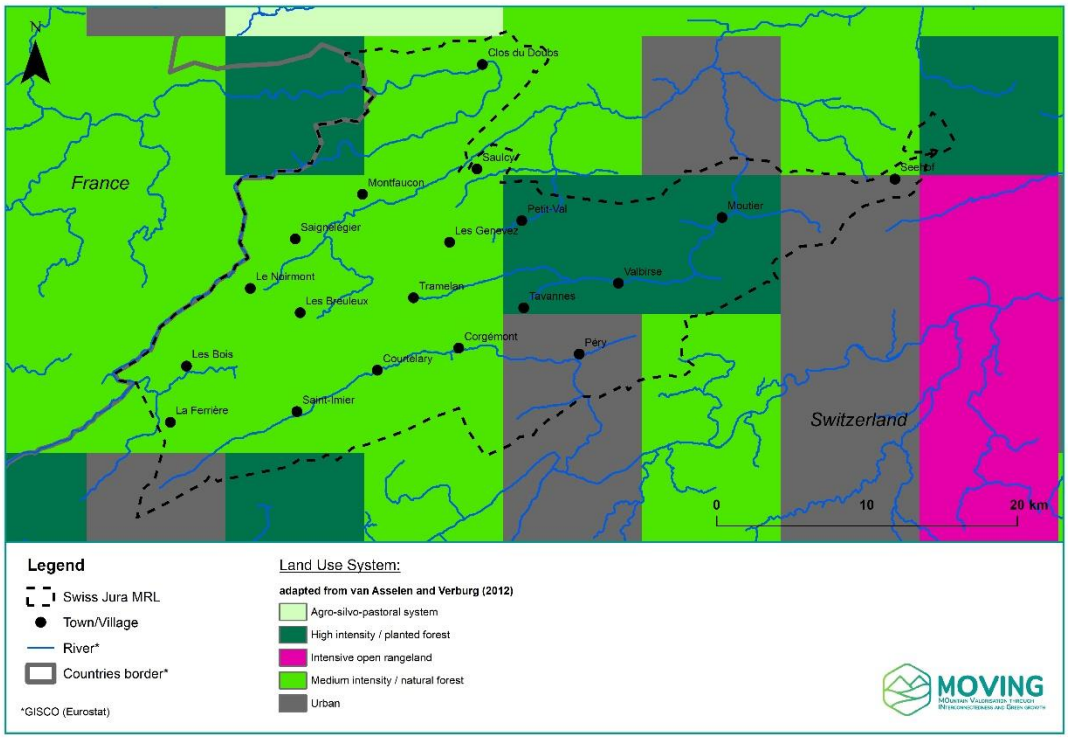


***Figure 4 The Mountain Regional Lanscape***

**Short Description land-use system (100 words max)**

The geographical area comprises the mountain region and the summer alpine pastures (included in the mountain region) of the districts of Franches-Montagnes, Porrentruy, the municipality of Saulcy and the district of Bernese Jura with the exception of the municipalities of Nods, Diesse, Lamboing, Prêles and La Neuveville. This area has been defined by the actors of the value chain and is included in the specifications of the Tête de Moine PDO.

**Name of the reference variable and linkage to the value chain()**

The reference variable is the annual production of grass and fodder expressed in terms of quantity and species diversity. It is linked to milk production for cheese processing. This is set out in the PDO specification, which sets a minimum limit of 70 % fodder from the geographical area. The remaining 30% may come from elsewhere, with the exception of silage, which is forbidden.

## 2. Process (200-400 words)

*Figures 5 & 6 Feeding the cows and maturing cheeses © Luca Piccin (left) & FRIJ (right)*

**Learning, difficulties and adaptations of the methodology at different stages of the process** (Interviews, Pre-Workshop questionnaire, Vulnerability Workshop, and expert assessment of adaptive capacity mechanisms)

The difficulties are linked to the very short time between becoming aware of the framework and the recommended methodologies and also between this moment, the realisation of the different tasks, and their analysis.
Also, unexpected events and opportunities, lead to adapting the fieldwork agenda, which adds complexity.
In my case, I had to contextualise the study first, and then simultaneously start the interviews, convene a workshop and launch the pre-workshop questionnaire. This tight schedule prevented me from carrying out the analyses sequentially. On the contrary, I accumulated the different materials collected during the different surveys (interviews, questionnaires, workshop), most of which remain to be analysed. Nevertheless, I managed to obtain 13 interviews (plus 2 informal ones / 15 planned), 10 questionnaires and 10 actors participated in the collective workshop (+ 1 on line - Teams). The interview participants provided complex and in-depth descriptions. They described the complex interplay of natural and human-induced drivers of change. During the workshop they also stated that the socio-ecological configurations in the MRL vary widely rendering difficult the assessment of the impacts per driver.

**Profiles and gender**: Indicate problems encountered during the stakeholder involvement. Discuss the balance of participants across groups. Comment on the gender balance obtained, difficulties (if any), and specific actions carried out (if necessary to achieve it).

Gender is a problematic issue in our study. While we expected to have a majority of men in the barns and in the pastures, we did not expect to have such an overwhelming majority of male individuals among experts and institutional actors. We had only one woman out of 13 interviews conducted!
That's how it happened. We organised a first meeting at the end of October with our contacts in the region (Fondation Rurale Interjurassienne). This meeting allowed us to identify a series of actors involved in the value chain. We then planned our interviews to be conducted during the first half of November. Among the people available, we had only one woman... We tried to find other women working in the value chain, but we did not have enough time.
But gender was also a problem in the way it was approached, as it seems to me that the question dedicated to it was not very appropriate (« gender self describe ») and needed at least more contextualisation, if not a topic in its own right.

## 3. Vulnerability components

### a. Drivers' description and components. Indicate the adopted description of the driver and the components selected based on the analysis of the interviews

| Driver | **Description and Components (max 100 words per driver)** |
|---|---|
| Precipitation | The rainfall regime is impacted by climate change (more frequent anticyclones). Snow is also less abundant. The phenomenon is more marked in the plains, the mountains are more resistant. But everywhere the lack of rainfall has a direct impact on grass and forage growth. |
| Temperature | The average temperature tends to increase. There are more sunny days, especially in summer, which can lead to a slowdown in grass growth (evapotranspiration), in a context of shallow, calcareous soils. |
| Extreme events | Droughts can lead to significant forage losses. These phenomena seem to be more frequent and prolonged. They also reveal a kind of 'ease' in managing the fodder resource, as many producers rely on being able to buy 30% of the fodder from outside the PDO geographical area. Hail is also an extreme problematic event as it can negatively affect the quality of the forage. |
| Wildfire | Fires are exceptional and have no impact on production (to date) |
| Pollution | Pollution is rather endogenous, linked to unbalanced manure balances. According to scientists, the cause of these imbalances is to be found in the supply of external fodder. Nevertheless, these are isolated and punctual phenomena. |
| Pests, diseases, and invasive species | Voles can cause serious problems, especially in years when their populations are abundant. They burrow into pasture soils, negatively affecting productivity. Some exotic plants are also spreading, although this is more pronounced in the lowlands than in the mountains, and should be monitored in the medium term. |
| Over-exploitation of resources | Overexploitation of resources is latent, i.e. it appears during prolonged droughts, which cause fodder yields to fall. Some farmers may then run out of fodder. They buy it from outside or acquire plots of land (including outside the PDO geographical area) dedicated to this purpose. These phenomena are rare for the moment, and seem to be linked to particular configurations (sloping pastures, very stony, chalky and shallow soils, difficulties in storing hay). |

| | |
|---|---|
| **Demographic changes** | Demographic change can be a problem within the farming population, as it is increasingly difficult to find new farmers. Another issue is the increasing number of tourists, especially since the pandemic. This leads to a positive response at fairs and markets, but also to over-frequentation by hikers and walkers, which can cause problems for the breeders. |
| **Soil physical degradation** | The soils are naturally fragile, as they are shallow and calcareous. There are some compaction phenomena linked to the interventions of the machines, which must be taken care of, but on the whole, the pastures are managed correctly and are preserved. |
| **Land-use and land-cover change** | The main changes concern the wooded pastures, typical of the Franches Montagnes. This change is manifested by a bipolarisation with forests on one side and pastures on the other. This dynamic mainly concerns cultural and identity values linked to the preservation of a traditional landscape, but biodiversity is also impacted. The value chain is not directly impacted by this change. |

## b. Susceptibility indicators:

List the indicators and comments per driver discussed during the workshop.

| **Driver 1: PRECIPITATIONS** |
|---|
| **List of indicators selected:**<br>• Seasonal total precipitation<br>• Mean annual precipitation (sum of monthly precipitation) |
| **Comments (gaps or comments about indicators):**<br>The absence of rainfall directly affects grass growth expressed in: kg MS/ha/jour<br>MS: “matière sèche” (dry matter)<br>Despite existing studies and scientific observations, "the effects of water stress remain a factor of uncertainty" (Mosimann et al, Agroscope Science \| No 49 / 2017, p. 10) |

| **Driver 2: TEMPERATURES** |
|---|
| **List of indicators selected:**<br>• Mean seasonal temperature (spring-summer-autumn)<br>• Maximum daily temperatures |
| **Comments (gaps or comments about indicators):**<br>Higher average temperatures favour evapotranspiration and negatively affect grass growth expressed in: kg MS/ha/jour<br>MS: matière sèche (dry matter)<br>Higher temperatures are particularly damaging during droughts and are combined with low or no rainfall and the calcareous nature of the soil and its slope. |

| **Driver 3: EXTREME EVENTS** |
|---|
| **List of indicators selected:**<br>• Number of days without rain (summer) |
| **Comments (gaps or comments about indicators):**<br>Prolonged droughts negatively affect grass growth expressed in: kg MS/ha/jour<br>MS: matière sèche (dry matter). (Cf. figure 2)<br>Hail can also affect both quantity and quality of fodder.<br>Faced with the risk of drought, two strategies are applied by farmers in spring. One is based on a late cut, at the beginning of June, to secure the yield. The other aims at an earlier harvest, at the beginning of the orchardgrass heading, i.e. in mid-May, to favour the quality of the fodder. The development of the vegetation in spring depends mainly on the temperature. These individual adaptation solutions are known and can vary according to the complexity of each singular configuration.<br><br>Mosimann E., Bossuyt N., Frund, D., |

*Préparation de la production fourragère au changement climatique*,
Agroscope Science, 49, 2017, 1-36.

Meisser M*.,* Lüscher *A.,* Mosimann E*.,*
*Changement climatique et production fourragère*: à *quoi faut-il s'attendre en 2050?*,
ETH Schriftenreihe zur Tierernährung, 40, 2017, 47-57.

Mosimann E.,
*Conséquences du changement climatique pour la production fourragère.*
Montagna, 3, 2016, 12-13.

Meisser M., Deléglise C., Signarbieux C., Vitra A., Mosimann E., Buttler A.
*Impacts of spring and summer droughts on yield and forage quality of three grasslands.*
Grassland Science in Europe, 21, 2016, 792-795.

**Driver 4: PESTS AND INVASIVE SPECIES**

**List of indicators selected:**

- Types of plants recorded after monitoring
- Voles density per surface (Number of individuals per surface unity)

**Comments (gaps or comments about indicators):**

1) Observations of certain plants of the Brassicaceae family behaving invasively in grasslands are increasing. These observations seem to be linked to climate change and in particular to the droughts experienced in recent years.
Although they are non-toxic, they are not consumed by livestock and take the place of good forage plants.
Among these plants, we advise you to watch out for
- *oriental bunia* (invasive species), in the plains ;
- common barbary (native species), in the plains and mountains;
- *Sisymbrium officinalis* (native species), in the plains and possibly in the mountains;
These plants are mainly observed in pastures, but also in meadows (including temporary meadows). They are also found along roadsides and railways.

2) Ground vole populations develop in a cyclical manner. If nothing is done to control them, every five to seven years outbreaks can occur with dramatic consequences for grasslands and pastures:

- reduced yields and even total loss of the crop
- soiled fodder
- increased wear and tear on harvesting machines
- deterioration of the botanical composition and quality of the forage

*But farmers and agricultural services are well aware of this problem and are constantly monitoring the situation, implementing all necessary measures.*

*https://www.agroscope.admin.ch/agroscope/fr/home/themes/production-vegetale/production-fourragere-herbages-systemes-pastoraux/bestandeslenkung-duengung/maeuseregulierung.html*

## c. Ranking of drivers

**Brief analysis of the results. Explain interesting patterns or deviations from expected (approx 100 words)**

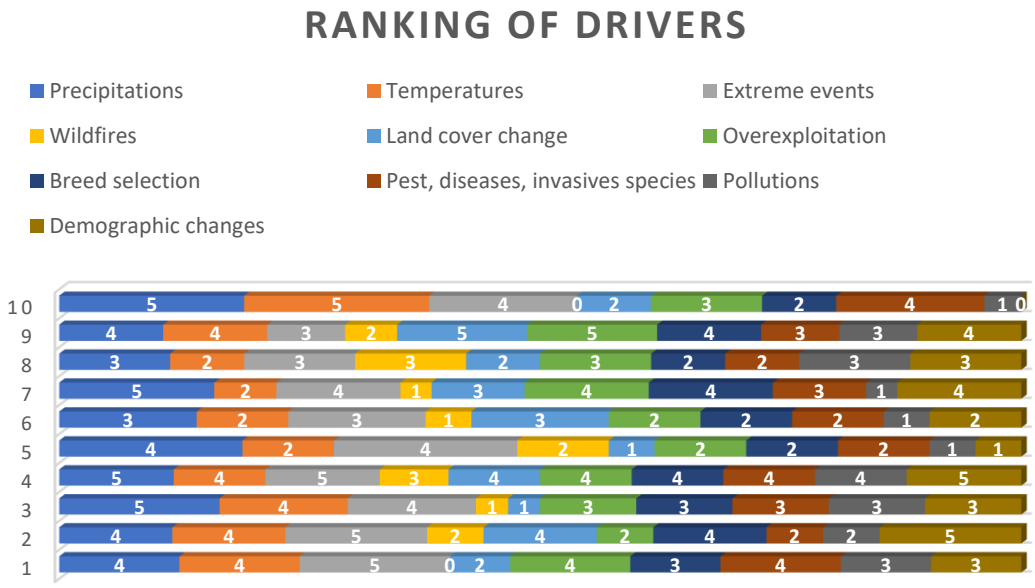


*Figure 7 Ranking of the importance of the drivers of change*

According to the participants, the most dominant drivers of change for herb and fodder production are exogenous factors; above all there are droughts, which interact with decreasing precipitation and increasing temperatures. The demographic changes were mainly related to the difficult generational turnover in the agricultural population. The driver of overexploitation and pollution was raised mainly by the scientific experts, and it was evaluated mainly as a future potential threat.

## d. Perception of past trend and future projection, sensitivity

### i. Perception of past trend and future projection

**Brief analysis of the results. Explain interesting patterns or deviations from expected (approx 100 words)**

The effects of climate change on pastures are well documented in the scientific literature and are known by the actors of the value chain. However, stakeholders tend to minimise the effects of human practices, and more particularly those of intensive agricultural practices. Thus, during the collective workshop, while I recalled the opinion of scientists, tending to point the finger at this type of practice, some actors in the value chain, notably economic actors (i.e. interprofession, chamber of agriculture, ...), rather defended existing agricultural practices.

### ii. Sensitivity.

**Brief analysis of the results. Explain interesting patterns or deviations from expected (approx 100 words)**

The results of the sensitivity survey converge: all participants agree that the increase in average temperatures, the frequency and intensity of extreme events (droughts, but also hail), and the decrease in precipitation, have a negative impact on grass growth. Nevertheless, discussions were lively, as these impacts can vary within the MRL, especially in higher areas where, paradoxically, these factors can also have a positive role, e.g. a longer season and therefore higher forage production.

## e. Adaptive capacity mechanisms

**Please include some clarifying or explanatory comments on the values given to the feasibility of the mechanisms and the potential for impact reduction, if you think they may be relevant to understand the value given. (approx 200 words)**

A collective exercise allowed the prioritisation of the proposed mechanisms. It can be noted that the priority solutions are essentially economic in nature, and do not directly aim to mitigate the effects of climate change or improve the resilience of the territory.

To obtain the proposals, we asked each participant to write down the adaptive mechanism(s) on a piece of paper. We then record all the proposals on a paperboard, taking care to eliminate all redundant ideas. We gave each participant three stickers to give a score to the proposals posted. Gold sticker = 3 points; silver sticker = 2 points; bronze sticker = 1 point (see the photo below).

The five proposals with the most points were discussed collectively. They are listed below, in order of importance.

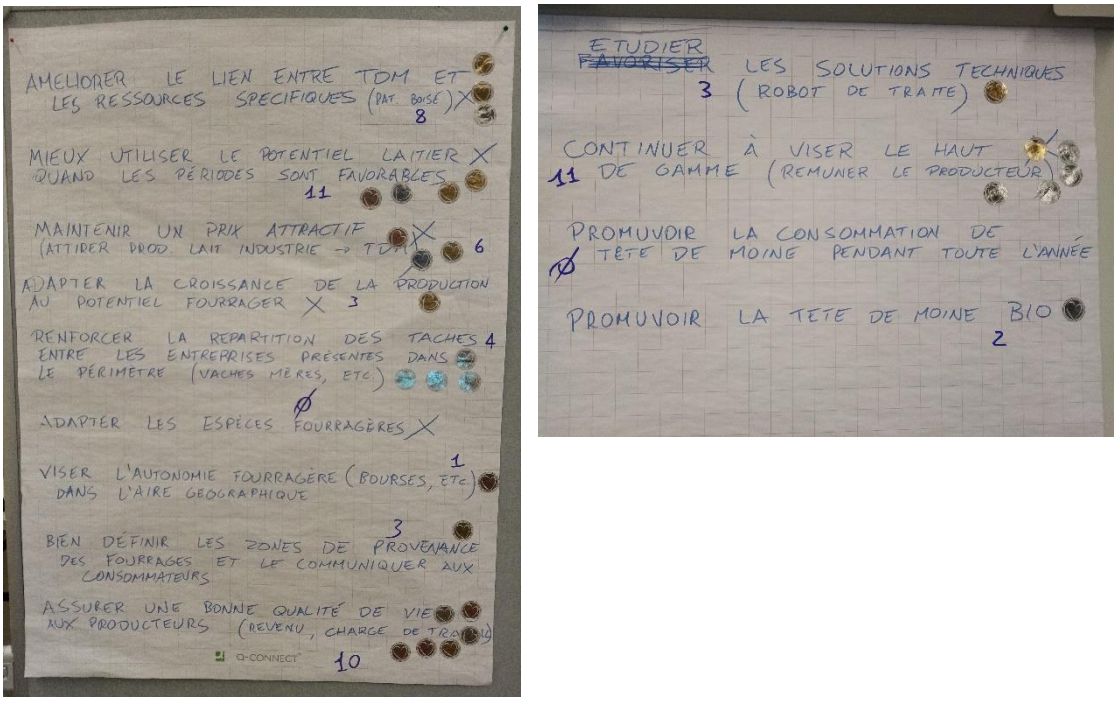


*Figure 8 Collective selection of the adaptive capacity mechanisms with coloured stickers*

1. **Better use of the milk potential when the seasons are favourable**

Due to climate change, vegetation starts earlier and earlier. Autumn also lasts longer and often offers favourable grazing conditions. It is therefore important to exploit the opportunities at the beginning and end of the season, as they can partially compensate for the more unfavourable periods in the summer.

This collective strategy should be extended to the other stages of the value chain. Demand for Tête de Moine is concentrated at the end of the year (with a peak in December), while milk is abundant between May and June. It is therefore necessary to work collectively to de-seasonalise consumption (sale of pre-packaged rosettes, marketing and communication, ...), or to improve the storage and maturing of cheeses (temperature-controlled cellars), or, at farm level, by encouraging the installation of barn dryers to better store fodder, which is lacking in winter.

2. **Continue to position Tête de Moine AOP in the premium quality segment in order to ensure an income and quality of life for producers.**

The quality of life of producers is essential and cannot be neglected. To date, the PDO has proven that it can provide a satisfactory income thanks to a better remuneration of the milk and a higher added value for the territory (especially compared to industrial milk). The requirements of the PDO contribute to the high quality of this cheese, which is appreciated on the swiss and international markets. That's why it's important to keep Tête de Moine in this profitable niche.

3. **Improve the link between the value chain and the specific resources (such as wooded pastures).**

The wooded pastures are a cultural landscape that contributes to the collective identity of the Franches Montagnes district and even of the Jura region. The pandemic has shown the extent to which the population is attached to this territorial resource, which also enables other value chains to exist, for example the breeding of Franches Montagnes horses, the only endemic breed in Switzerland. Furthermore, it has been proven that trees create "fresh islands effects", so their presence can provide a buffer against extreme droughts.

4. **Maintain an attractive price, in particular to attract industrial milk producers to the Tête de Moine value chain.**

Idem as (2). It should be noted that an important project (Créalait), which has obtained funding from the Swiss Confederation, has just been launched to convert industrial milk producers to "quality milk" (Tete de Moine PDO).

5. **Strengthen the division of labour between the enterprises in the area (management of mother cows, heifers, cheese dairies, etc.).**

Greater division of labor may result in increased specialization, but it also highlights the degree of interdependence of the value chain with other value chains such as meat production for example. These interactions and complementarities between roles and functions should be optimized.