

EXPERIENCING AND ADAPTING TO CLIMATE CHANGE IN THE FRUIT AND VEGETABLE SECTORS.

EXAMPLES FROM HUNGARY.

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Special Session 07: [Researching Vulnerability: Spatiality and lived experiences to climate change](#)

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The presentation is based on ongoing research that aims at exploring the impact of climate change in the most intensive sectors of farming and assessing farmers' perceptions, explanations and willingness / ability to adapt. The project, supported by the NKFIH (132975), aims at drawing broader conclusions from the research results in relation to a postulated second round of rural transformation in Hungary since the fall of state socialism in 1989. This process seems to advance after farm and related ownership structures had been reshaped and more or less crystallised following the privatisation/dissolution of large-scale farms in the 1990s. Farmers in the fruit and vegetable sectors, who have been engaged in building and stabilising their farms for the last three decades, nowadays face the dual and increasingly pressing challenges of climate change and labour-shortage that have been transforming farming conditions recently. *How do they perceive and explain these challenges and how do they respond to them? How do CAP subsidies support farmer adaptation processes in the sectors under investigation? What is the role in increasing the adaptability of producers of such mediating organisations as Producer Organisations (POs) and other forms of co-operation? How does the second round of rural transformation unfold from individual and collective decisions of farmers pressed by climate change, and finally, what predictions can be made about the cumulative effect of adaptation efforts on the profile of farming in the local context?* These are the main research questions to which the project aims to respond, using predominantly, but not exclusively, qualitative research.

As far as the theoretical background elaborated by Király (2021) and Koós (2021) is concerned two concepts were considered most relevant from the point of view of the project, vulnerability and adaptive capacity. *Vulnerability* is a well-established concept in climate-change science; however, there is a lack of clarity over its precise meaning. Conceptual approaches share the view that it means susceptibility to harm and is comprised of exposure, sensitivity, and adaptive capacity (Ford et al. 2018). There is one important point of distinction related to the concept that is worth highlighting.

Outcome vulnerability focuses more on factors directly attributable to climate change, while research on *contextual vulnerability* views vulnerability as a present state embedded in socioeconomic contexts that determines the ability to cope with external pressures or changes (IPCC 2014a).

Research on *adaptive capacity* came to the fore in 2001 after the third IPCC Assessment Report. Like vulnerability, adaptive capacity is also burdened with conceptual problems. In his systemic review, Siders (2019) identified five differentiating definitions for adaptive capacity in the literature, clearly highlighting the lack of consensus in this field. The most frequently used definition was developed by IPCC in 2007: “*adaptive capacity is the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behaviour and in resources and technologies*” (Adger et al. 2007:727).

To translate these theoretical considerations to our research, the most vulnerable farms engaged in intensive farming are pressed both by climate change and an increasing shortage of labour. Young and middle-aged managers of well-performing farms have either already started to invest in new technologies, irrigation and digitalization or are preparing to opt for such investment. Adaptability is significantly enhanced by specific co-operative and advising capacities provided for their members by bodies such as producer organisations or other forms of co-operation.

The ability to reduce or alleviate the impacts of climatic change varies territorially reflecting natural and climatic endowments, size categories and sectors of farming. Adaptability and farm succession are also mutually related. Older farmers, especially if they lack a successor, either continue to farm on a smaller scale with less intensive technologies (e.g. they might shift from heated to non-heated indoor gardening), or abandon farming altogether.

The profile of farming, threat of climate change and adaptability of farmers by research site are illustrated by the table below:

	Tolna hills	Szentes and its surroundings	Nagykőrös district	Máttra hills
Size and agricultural character of the research area	One small town of 13,000 and 5 villages of 3,000 inhabitants, hilly, fragmented landscape, mixed farming with local profile: orchards	One market town of 27,000 and 4 villages of 11,000 inhabitants, flat plain, mixed farming with local profile: vegetable growing	One market town of 24,000 and 2 villages of 4,000 inhabitants, flat plain mixed farming	One town of 27,000 and 5 villages of 13,000 inhabitants, hilly, traditionally vine-growing area
Demographic characteristics central town/villages	Depopulating (town:-15%, villages -21% average since 1990)	Depopulating (town:-15%, villages -20% average since 1990)	Mixed: (town:-10%, villages: 5% average since 1990)	Declining (town:-19%, villages -15% average since 1990)
Social characteristics	Depleting, low-income	Depleting, low-income	Depleting, low-income	Better than average, high income
Economic characteristics central town/villages	Weak and one-sided local economy, high importance of agriculture (town: 4%, villages: 17% average)	Diversified local economy dominated by agriculture and food industry. Agri: high importance of intensive horticulture farms (field, poly tunnels, glass houses)	Diversified local economy dominated by agriculture and food industry. Agri: mixed farming is typical, intensive farming is also mixed (orchards and vegetables)	Diversified local economy, strong tourism and service sectors, manufacturing - large scale foreign based companies. Agri: vine-growing stands out

Climate Change Experience since 2019	Severe frost in the last two years, 90% of apricots lost, drought during the summer and new varieties of pest	For farms with unheated poly-tunnels: more frequent extreme weather events, new pests and diseases	Regular frost damage, extremely warm and dry weather in summer now typical.	Spring frost, drought and extreme heat in the summer; emergence of new pests and diseases
Adaptive practices	old and new practices (heating, watering, ventilation, change of breed)	Heat protection (white paint – liming), biological pest control, (new) resistant plants, increasing the number of layers for the poly-tunnels, water spraying during frosts, technical developments	Variety change, restructuring (afforestation), frost protection irrigation, ice net, implementation of irrigation development investments.	timing of pruning, reducing exposed leaf area, reducing planting density; protecting berries from excessive sunlight (using shading nets), soil management
Adaptive abilities	Selective ability to adapt, small monoculture farms will disappear. Flexibility of mixed farmers helps overcome repeated damage	Farmers are willing and able to adapt.	Limited abilities of farmers to adapt (lack of skills, financial resources, positive experiences)	Irrigation – limited opportunities (lack of exploitable water resources), mechanisation, for the larger and profitable farms: significant investments
Expected impact longer term	Orchards will continue to exist with more compatible breeds and defence techniques	In recent years large and middle-scale farmers have invested to increase irrigated and covered areas; intensive vegetable growing will survive	Some of the larger producers will continue intensive fruit production, with many small producers giving up farming. Land-use change.	Vine-growing will continue with decreased productivity

The table illustrates how communities with different characteristics and entrepreneurial groups of varying strengths try to address climatic changes. From the point of view of the composition of local society, the villages of the *Tolna hills* are the most vulnerable; they have the highest ratio of unqualified individuals living mainly from occasional agricultural labour, often, but not exclusively, of Roma ethnicity. There are many 'smallholders' too amongst the fruit-growers, monocultural operators on 1-3 hectares, who do not have the possibility to switch profile between branches with different degrees of profitability as do the owners of larger, mixed farms. It is therefore certain that the selection process that has already started will continue: the weight of bigger farms will increase at the expense of declining smaller mono-cultural farms. There are similar problems in the *Nagykőrös* region where the impact of climate change has been more severe because of local climatic conditions. Furthermore, unlike the *Tolna and Szentés* areas, there are no effective cooperative organisations there which might assist their members with professional advice or integrating sales. The producer group and alliance that is both the most populous and strongest in economic terms is to be found in the *Szentés* area. There Hungary's strongest Producer Organisation (PO) integrates vegetable and fruit growers in a region where there is a century-long tradition of such activity on both small-scale and large-scale farms. At the same time, this region on the Great Plain is in decline too and young people are leaving because of the poor earning potential in the town. The most developed and well-to-do of our research sites was the *Mátra region, the town of Gyöngyös and its surrounding*. Grape-growing and wine-producing were built on serious traditions here too, but, compared with the other wine regions, they were beyond a more difficult and longer transition phase which extended from the large-scale production of medium or weak wines to small-scale viticulture which created quality wines.

Our results suggest that at all four sites, the producers, for the moment, want to continue farming as they do now, and with more or less the same profile, although not all of them will have the capacity to do so. Whatever the context, their decision will be an element in the transformation process that is structuring, short-term and long-term, the perspectives and conditions that allow those dependent on agriculture, farmers and farm workers, to make a living; and this demonstrates that climate change has a significance beyond itself: it transforms significantly rural economic and social structures.

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