

Workshop
“Climate Change, the Environment and Tourism : the Interactions”

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Draft proposal for a research agenda

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INTRODUCTION: THE INTERACTIONS...

Regarding tourism, three different types of issues are raised by climatic change.

- The effect of climate change on the climatic and non climatic resources of tourism: changes in climatic conditions according to seasons and regions, effect of climatic change on “environmental resources” (water, landscape, snow for winter sports etc). After an evaluation of potential impacts, the question is “How will tourism adapt ?”, according to the different scenarios built for climatic change.
- The contribution of tourism to climate change. Tourism is, though transportation mainly, a major contributor to greenhouse gas emissions, by emitting CO₂, and other gas (mainly CH₄, N₂O), and through specific phenomena (contribution to the formation of cirrus clouds by airplanes for example).
- The possible effects of greenhouse gas (GHG) mitigation policies on tourism. Given the overwhelming importance of the stakes linked to global warming and a contribution by tourism which is far from negligible, this activity is bound to be concerned by mitigation policies. This is a broad issue which is largely ignored but needs to be explored, probably under various and contrasted hypotheses.

1. THE IMPACT OF CLIMATE CHANGE ON TOURISM

1.1 A MAJOR CONSTRAINT : THE UNCERTAINTY ON REGIONAL AND LOCAL CLIMATE CHANGE

At present, **research on tourism and climatic change is very dependent on the current state of climate research, since the possibility of tourism research depends on the reliability of climatic scenarios**, especially at regional and local level. It is partly bound to remain so, but it should also gain increasing autonomy in formulating specific research questions.

Discussing the future potential impacts of climate change on tourism **should be based on a state of the art of current scientific knowledge regarding this phenomenon**. Current knowledge on climate change is built through a process gathering within the International Panel on Climatic Change (IPCC or GIEC in French) thousands of scientists worldwide, belonging to the different disciplines implied in studying climate and its effects (www.ipcc.ch). The knowledge produced is discussed by peers and presents the best scientific guarantees one can expect.

The current state of the art (IPCC 2001) highlights on a world scale the following points.

a) The climate is globally bound to get warmer –no existing model concludes that it could remain stable or cool down- and this is related to anthropogenic emissions of greenhouse gas.

b) The most recent models lead to a warming of 1.5 to 6 degrees by the end of the century. The increase over the continents should on average be 1.5 times greater than over the oceans.

c) This is but 50 to 90% of the maximum which is to be attained. The level at which this stabilisation will take place highly depends on how fast GHG emissions will be curbed.

d) We have no historical analogue to figure what happens with a fast warming of a few degrees over current temperatures.

e) We can be faced with climatic surprises even though the models are not sophisticated enough to show this. One of the most devastating for Europe could be the disappearance of the Gulf stream (Duplessy, 1996; Duplessy and Morel 2000). Such a phenomenon happened several times 15 000 years back, it only took a few decades and resulted in a downfall of average temperatures in Europe by 5 to 6° (Bard 2002).

f) As regards the variability of climate, notably the occurrence of extreme events, the IPCC remains cautious. It seems too soon to be sure that Europe will be faced with phenomena such as the hurricanes which struck at the turn of the century in France. We should though remember that phenomena such as El Nino and La Nina are associated with changes in temperatures no greater than 2 or 3°. Yet an increased frequency of floods seems probable at our latitudes.

g) Last, but not the least as regards our subject, changes in temperatures should vary according to places. The models validated by the IPCC use grids that are several hundred kilometre wide: roughly, the point is that, given the power of current computers, working with a tighter grid implies shortening the time horizon. This is why regional models are less reliable than global ones.

The main limitation of forecasting the impacts of climate change on tourism, is the remaining uncertainty of the extent of global warming and furthermore of its local effects, even if further climatic research should provide increasingly detailed and reliable scenarios. Given that tourism is very dependent on local features, **the lack of reliable local scenarios for climate change implies a high uncertainty in forecasting local impacts on tourism.**

1.2 CONTRASTED SCENARIOS RATHER THAN FORECASTING

However, it seems already important to evaluate the potential effects of climate change, since the time of response of the tourism industry to environmental change is directly related to the life time cycle of the tourism product: that is 20-30 years.

As regards to this situation, the **recommended approach should be to elaborate contrasted scenarios of local climate change, and to evaluate contrasted impacts.** Research should avoid terms like “forecast” and present results as an assessment of the “potential for change regarding tourism”, so that tourism stakeholders can benchmark their activity.

A few more questions remain on the validity of this research :

- **What should be the starting point ?** Given that IPCC is quite reluctant to publish regional scenarios, are there any existing climate scenarios which reach a sufficient degree of consensus to allow the community to work? If not, how do we deal with that difficulty?
- **Will the range between extreme scenarios remain narrow enough to produce useful results ?** To the uncertainty on climate evolution, one should add uncertainties on effective impacts, reflected by statements such as “a decrease of 10% of snow cover could lead to a decrease from 10 to 30% of mountain tourism winter frequentation”. The risk could be to produce results like “your climatic future is between 20% more snow and 30% less, and your tourism future is between 40% more tourists and 50% less”, which would actually be of no use for tourism stakeholders.

Therefore, prior to any applied research on impacts for a destination or a specific activity, a research program should include **a collective expertise of the validity of climate change hypothesis and their implications on the variability of results,** for the expected case studies.

1.3 EVALUATING THE IMPACTS: VARIOUS APPROACHES

Once this major constraint is known and assumed, it is possible to imagine various perspectives:

- **A global perspective.** The tourism market is more and more global, even if it is somehow regrettable (since tourism destinations should develop relying on their more specific resources, such as cultural diversity, local ecosystems...); destinations with the same climatic resources (tropical weather and warm bathing water..., warm winters) compete worldwide. **A first task could be to identify to what extent climate change could redistribute climatic assets among macro-regions.** A global approach with global climate change scenarios using large regional grids (hundred of kilometres) could be sufficient to estimate for instance whether the Caribbean would be reinforced or weakened, compared to Polynesia or Indian Ocean. Moreover, **these global scenarios would provide baseline information for the development of more local scenarios** : before envisaging the future of Costa del Sol, it seems useful to know whether tourists are more likely to concentrate in the Mediterranean as a whole, or to fly away to colder regions.
 - **Such an approach should involve a large network of researchers, with a process of scientific validation similar to IPCC.**
 - The main factor influencing the repartition of these competitive advantages is the **climatic motivations of the tourism demand**, which is quite well known, (Besancenot 1989), (Burnet 1970) but should be confronted to the perspective of different climate situations.
- **Regional and local perspectives.** More regional and local surveys, most of them quite exploratory, than global ones have been developed in recent years (Elsasser and Burki 2002), (Department of the environment 1996), (Ceron, 2000), (Ceron and Dubois 2002), (Giles and Perry 1998), (Harrison, Winterbottom and Sheppard 1999), (König and Abegg 1997), (Scott 2003), (Wall 1998). These approaches can be based on a national scale (France, Great Britain), a geographical perspective (mountain, coastal areas) or an ecosystem approach (wetlands, deserts...). The added value and the contribution of a research program could be :
 - **Comparative research** : which are the more endangered ecosystems as regards to tourism, why are some tourism destinations more sensitive to climate change than others (diversity of the tourism supply, presence of man made and cultural attractions...), what are the different methodologies employed ?
 - **To gather research which adopted different perspectives so as to produce more thorough evaluation of specific cases.** For example, to evaluate the future of tourism in French "Camargue", a research project could gather specialists of wetlands, of French tourism, of Mediterranean tourism, of coastal resorts...
- **Activity-oriented research.** Tourism destinations are a mix of various tourism products, which can drive it difficult to evaluate the effects of climate change on specific activities. Some research concentrated on the impacts on such activities, be it skiing, canoing and other river sports, bathing activities (Holmes, Palmquist

and Steiger 2000), (Mc Boyle and Wall 1987). Most of these research concentrate on “non climatic ressources” of tourism : water availability in rivers, landscape evolution, snow for winter sports...

1.4 ADAPTATION STRATEGIES FOR TOURISM STAKEHOLDERS

Once the potential impacts of climate change on the tourism activity are better known, it is possible to concentrate on **adaptation strategies for the tourism sector**.

The first research question concerns **political science, about the governance of the tourism sector in the context of climate change**. Owing that climate change is a long term phenomenon, the effects of which cannot yet be predicted in detail, how is it possible to involve stakeholders in adaptation strategies ? Long term precautionary measures are generally out of concern for private operators. So, should only governments endorse adaptation strategies, given the general weakness of tourism policies ? What kind of public-private partnerships can be imagined ?

Indeed, climate change will call, tomorrow or the day after, for policy response from private operators as well as from public stakeholders. **The wide range of responses has to be evaluated, with criteria such as technical feasibility (Scott , Mc Boyle and Mills 2003), profitability, capacity to cope with uncertainty, impacts on the environment**. Three main attitudes can be explored as regards to climate change (Ceron and Dubois, 2003).

- **To wait until the level of knowledge increase**, considering that short term responses will be more efficient than long term precautionary measures, and that responses will be more accurate once the concrete implications of climate change are known.
- **To trust the ability of technology to face environmental change**. Since the beginning of the 80's, for instance, French ski resorts are engaged in a strong investment of artificial snow cover (more than 160 resorts equipped), aiming to reach a “snow insurance”, considered as a strong marketing argument. *Center Parcs* is about to build a third resort (the 15th in Europe), which a “tropical paradise” warranty: i.e. a 28°C bathing water all year long. Natural beaches can be replaced by artificial ones... Some questions surge from this approach : to what extent could tourism operators endorse this additional investment to cope with climate change ? Would the profitability of the sector be maintained ? Would customers favour these man made environments ?
- **To adopt a precautionary attitude**, which would encourage a flexibility of the tourism sector and improve its ability in responding to environmental changes. The two majors factors influencing the adaptability of the tourism sector are the reversibility of planning and the diversity of the tourism supply. The *Erika* oil spill, for instance, clearly showed that destinations with more diversified assets, customers, accommodations and equipments better resisted than destinations only oriented towards camp sites accommodations and bathing activities. Developing off-ski activities (hiking trails, pathways, cultural events) in ski resorts could be more sensible and constitute a better insurance for the future than investing in

artificial snow cover. In that perspective, climate change responses can be integrated into a broader risk management policy of the tourism sector (diversification is a way of limiting tourism sensitivity to economic crisis as well).

Evaluating the relevance of these strategies, globally, locally or for specific tourism activities is a new field of research which is seldom explored.

2. THE IMPACT OF TOURISM ON CLIMATE CHANGE

Evaluating the impact of tourism on climate change is the second facet of our "interactions". Although transport research is addressing the issue of transports impacts on climate change, tourism research only started recently (Ceron and Dubois 2002), (Hoyer 2000, 2001), (Peeters 2003). Besides, the first evaluation of the case of tourism were produced by public institutions of the Environment, like the French Institute of the Environment (Ifen 2000), the Environment Protection Agency of the US (EPA 2000), or the Environment Directorate of OECD (OECD 2001), rather than by academics.

In spite of a considerable amount of research devoted to the environmental impacts of day-to-day household travel, until recently **only little work specifically focused on the environmental impacts of household tourism travel**. According to OECD, «*One source of tourism-related environmental impacts – travel - remains consistently and conspicuously absent from the general discourse on sustainable tourism.*» (OECD, 2001).

However, these first evaluations underlines the importance of these issues for monitoring the impacts of human activities on climate change. For example, we calculated for Ifen, that **the overall French tourism emissions, including accommodation and equipments, represent from 9 to 10% of French Global Warming Potential**. Tourism transportation represents about 80% of the total.

These results for tourism are not surprising, since the overall transport sector has a growing responsibility in greenhouse effect : the contribution of transport in French CO2 emissions climbed from 8% to 39% between 1960 and 1990 (Fontelle, Chang, Allemand 1999). The modal choices (and consequently the infrastructure development policies) have a strong impact on this contribution. In that perspective, **studying the dependence of tourism on transports, which is growing in EU countries** (more passenger.km travelled for the same amount of overnight stays) **seems central**, for ecological reason as well as for economic reasons.

A) Methodological orientations

- **Concentrating on transports**. With regards to climate change, **the evaluation of transportation impacts should be considered as a priority**: the Environment Protection Agency (EPA, 2000), estimated that for the United States 76,5% of CO2 of the tourism and recreation sector are caused by transportation (against 15% for lodging, 2,7% for restaurants, 1% for retail, and 4,8% which are

activity-specific). This share should be even higher if one includes non gaseous sources of radiative forcing from airplanes. On-site travels usually have a lower impact than the travels from home to destination. In Calvia (Balearic Islands) on-site tourist movements represented 73 000 tons of CO₂ in 1995, whereas air transport to the destination contributed eight times more to greenhouse gas emissions (534 000 tonnes) (Ajuntamento de Calvia, no date).

- **Linking tourism and leisure mobility.** What is the impact of leisure, be it with or without overnight stays ? Even if tourism is defined by WTO as including at least one overnight stay outside permanent residence, with regards to climate change, this definition of the field of research appears too narrow. Actually, the border between leisure and tourism is more and more blurred and porous (Viard, 2002a, 2002b). Moreover, some clear substitutions effects exist between tourism and leisure, which can strongly impact on greenhouse gas emissions : the intensity of the tourism demand depends on the quality of life in the place of residence, and on the possibility of leisure near the home (Ceron and Dubois, 2003, to be published). The initial point should be "how do leisure impact on the atmosphere, what are the respective shares of tourism and leisure near the home, and how do they interrelate ?".
- **Why should tourism research pay attention to transport research ?** One could argue that since transport research is already addressing the issue of climate change, tourism research would be redundant in that field. However, the purpose is here to evaluate the *share* of tourism / leisure in transport impacts, so that to distinguish, for instance between freight transport and passenger transport, and within passenger transport between different motivations (work, shopping, leisure, tourism...). The objective is to link data on tourism demand and flows with emissions of GHG, so that transport policies and mitigation policies can distinguish between the different responsibilities in climate change, and undertake differentiated initiatives. Indeed, tourism and leisure relate to issues such as quality of life or freedom to travel, and tourist can surely not be treated like freight. **The objective is to go one step beyond macro-sector evaluations, and to insist on the impacts of production and consumption patterns on emissions profiles.**
- **Road transport in the short term, air transport in the long term :** at present, almost 80% of the French travel by car for their holidays. Road transport is responsible of more than 60% of French tourism transport GHG emissions (from France and to France : Ifen 2000). Air transport is not yet part of the Kyoto protocol, although it should be more concerned by mitigation policies in a nearby future (White paper on transports in the EU, 2001). According to Schaefer and Victor (1997) and OECD, there would be, worldwide, five times more passenger.km travelled in 2050 than in 1990. The **air transport share** should be more or less the same than the road transport share and, given higher emissions factors, its contribution to climate change **should exceed road transport emissions around 2030**. The future of tourism by road transport appears clearer (staggering of domestic tourism departures, technological improvements of cars, perspective of European norms for cars emissions...), compared to air transport, which is more uncertain (slow technological improvement, economic health of airlines, sensitivity to crisis, reluctance to environmental regulation and taxation...).

- **An urgent need for common methodologies.** GHG mitigation policies rely on inventory emissions harmonised on common basis, in order to set policy targets. Each round of negotiation of the Kyoto protocol reveals strong debates about what should be evaluated and how. As a major economic sector, tourism should not stay apart from these debates. **Methodological collective works, in order to reach experts consensus on evaluating the impacts of tourism on climate change, would be very useful.**

B) Monitoring the impacts : a priority to national sector-oriented evaluations

Although a few evaluations have been developed for destinations (Ajuntament de Calvia, no date), private operators or individual travellers, (Garrod, Wilson and Bruce, 2002), the priority should be given to sector-based national evaluation.

– **National evaluations.**

Inventories of GHG are national based, since IPCC negotiations are national based. The national scale is a priority so as to allow tourism to be included on broader discussions on climate change. This raises several questions, and calls for different kinds of assessments.

Methods

- **Who is responsible for the impact of international tourism on the atmosphere** Emitting countries, in a consumption approach, receiving countries, in a production approach (since they benefit from tourism), airlines companies, whose nationality is harder and harder to determine ? Air transport, like maritime freight transport, poses difficult methodological and ethical problems to the evaluation of GHG emissions. Future research could discuss these questions and introduce ground rooted ethics into the debate (for instance: are remote destinations more legitimate to use air transport because they do not have any possibilities of substitution ? should the priority be given to developing countries ? are there differentiated and asymmetric responsibilities among countries ?).
- **How to improve methods for estimating the impacts ?** Rough evaluations only based upon a number of passengers-km travelled, multiplied by modal average emissions factors, do not seem sufficient to have a clear perception of the impacts. Indeed, real emissions depend on factors such as the load factor of vehicles, age, motorisation, air conditioning of cars, types of travel (speed, altitude, charter or regular flights for air transport...), technologies (does the propulsion of trains rely on renewable or non renewable energies ?). The objective is to reach more rigorous and less questionable evaluations (for instance through taking into account the impact of ongoing research on the environmental impacts of air transport (IPCC, 1999)), and to identify and rank the factors of improvement (is the solution to reduce speed on highways, to improve load factors of aircrafts, to tax kerosene...). Ifen's experience (Ifen 2000) showed that within the EU data often exists, but that using them requires a important effort of collection and processing.

Possible works

- **Country profiles would enable comparative research on production and consumption patters of tourism/ leisure mobility.** What are the factors explaining high-impact situations ? The distance from tourism destinations (Australia), infrastructure choices (what is the impact of high speed trains on overall

emissions ?), driving forces of the tourism demand (schedule of school vacations along the year), consumers tastes and behaviour (propensity to travel abroad of Germans, reluctance of Spanish, development of short stays...) ? **Elaborating countries profiles on a common basis requires an important work on tourism and transport databases.**

- **More specific and localised research** could be done : comparison on modes of transports (Hoyer 2000, 2001, Ifen 2000), of tourism products (Garrod, Wilson and Bruce 2002), of destinations policies, of tour-operators...

– **Sector-oriented evaluations**

The impacts of tourism on the environment can be parted between on-site impacts (including on-site transports) and transportation (to the destination) impacts. Even if the priority should be given to transports to the destination, each step of this consumption pattern contribute to global warming and, legitimately, should be evaluated, though it is not the case yet. Attempts were made as regard to energy consumption (Becken and Simmons 2002) or CO₂ emissions (EPA, 2000). It is all the more important as the different sub sectors (accommodation, transports, equipments, travel agencies) do not always consider themselves as part of the tourism sector (i.e part of the problem and potential contributors to its solution) : the activity is split up in various activities which do not often interrelate. However, "Tourism" seems a relevant category to discuss impacts of economic activities on climate change, and at least as relevant as "services", "hospitality and catering", "transports". In a sustainable development perspective, if one concentrates of the "needs" and their satisfaction, the need of leisure implies transport, accommodation, equipment... which should be evaluated as a whole.

Calculating **the total contribution of the overall tourism sector, be it at international, national or local level, remains uncertain because of the lack of required data.** The methodology for accommodation and equipment would require a knowledge of the number of overnight stays/visitors for each type of accommodation/equipment, allowing to multiply by ratios, such as the average use of energy per overnight stay/visitor. The breaking down between the different energy sources used (electricity, fuel, gas...) should be known to calculate greenhouse gas emissions.¹

- for accommodation, these ratios depend on the standard of comfort, the age of accommodation, the climate of the location (implying air conditioning, heaters...). This is why data based on local surveys are not very helpful. **Only a few surveys provide such ratios for hotels, camp sites, secondary homes on a national basis...Current research on eco-labelling and its forthcoming monitoring will provide more ratios in a nearby future;**
- there is also a **great lack of data concerning equipment**: very few data are available for theme parks, water parks... EPA research clearly showed this lack of emissions factors, though many sorts of high-impacting equipments develop very quickly (snow cover, boating, theme parks...).

Further, when lodging, catering and equipment are included in an overall evaluation, **it seems necessary to consider total impacts versus net impacts on climate**

¹ As far as electricity is concerned, it is possible to convert energy consumption into greenhouse gas emissions thanks to national data on electricity production and its splitting between sources : coal, nuclear, renewable, etc.

change (one does not consume energy at home while in vacations). It would not be fair to the tourism sector to just consider the *total* estimate. One should rather focus on the incremental emissions caused by tourism, and on the way of reducing them.

C) Defining the features of a low-impact tourism

Future research on the evolution of tourism/ leisure mobility demand and its impacts on climate change would be complementary to the evaluation of current impacts. It is then necessary to have a look on the **sociology of leisure, tourism and travel**. Indeed, the question on behaviours towards travel (propensity to travel, articulation between tourism and leisure times) seems central. This could involve :

- Research on the **history of tourism**. Past mobility patterns, attitudes to transport (the need for speed). Modal splits evolved quickly. For instance, in Greece, in 1954, 31% of international tourist arrivals used the plane, 30% the train, 31% the boat, and 8% the car. In 1999, this repartition turned to 76% for the plane, 0,2% for the train, 11,8% for the boat, and 12% for the road. These “lessons learned” could help benchmarking the potential of change for tourism in coming decades.
- Elaborating **mobility patterns prospects and calculating their impacts on climate change**. Mobility patterns will be more and more individualised in the future, as regards to changes in the organisation of times (diminution of working time), demography (retired people without time constraints). This could led to contrasted patterns.
- Elaborating **scenarios of overall tourism/ leisure mobility demand**, and analysing their compliance with sustainability scenarios. In that perspective, even extreme or quite unrealistic utopia should be tested: what would happen if every inhabitants of the earth had mobility patterns of Americans and Austalians ? What if each inhabitant did only one cruise trip around the world in his life ?

3. EFFECTS OF GHG MITIGATIONS POLICIES ON TOURISM

Tourism contributes significantly to the greenhouse effect, and relies more and more on transport: these two statements show the sensitivity of tourism to future transport policies in the context of a reduction of greenhouse gas emissions under the Kyoto protocol, and furthermore in the context of more restrictive transport policies which might emerge in the future.

In that perspective, tourism is not only questioned with regards to its own priorities (how to cope with an increasing mobility demand), but also with regards to its ability to comply with global environmental constraints.

A) Possible responses of the tourism sector

Scenarios would provide good opportunities to test possible responses of the tourism sector to the issue of climate change :

- **Technical responses** : what are the prospects of technology changes in the transport sector ? Are they sufficient to cope with the impacts, or is the improvement of emissions factors offset by the development of tourism flows ?
- **Socio-Economic and planning responses** : what would be the impact of a long term investment in High speed trains within the EU ? Of incentives for longer stays, etc. Is environmental management of tourism operator a practical tool to face climate change ?
- **Cultural change**. Can a low impact tourism utopia be imagined ? Preference given to “slow” tourism (boat transport), to soft mobility (biking, walking), enhancement of leisure and quality of life policies within the cities... Is the propensity to travel likely to change, and under which conditions ?

B) Impacts of Sustainable Development scenarios for the tourism sector

From maximalist perspectives (in which the right to emit greenhouse gas should be equally shared between all inhabitants of the planet), to more pragmatic ones (complying with the Kyoto protocol), tourism will be in the future embedded in a policy context that might impact on its developments.

Here again, **scenarios could contribute to assess the implications of various hypothesis.**

B) Analysing the awareness level of tourism stakeholders

In recent years, the awareness of tourism stakeholders on the impact of tourism on climate change, was upgraded by NGO campaigns (International Friends of Nature “Red card for air transport” campaign, “Carbon neutral initiative”), conferences (WTO Djerba conference) or web sites (www.chooseclimate.org). The nature of the response of the tourism sector and its capacity to adapt partly relies on this awareness.

Specific sociology and political science research could insist on the evolution of this issues in stakeholders discourses and representations, for instance by analysing the content and evolution of the environmental reporting of airlines companies and tour operators, opinions and preferences of business leaders.

B) Impacts of greenhouse gas mitigation policies

- Air transport : impacts of a kerosene tax on the tourism market. What is at stake ? Competitive advantage and comparative costs between destination, impacts on the tourism demand...
- European infrastructure choices and tourism. High speed train line to Istanbul versus spreading east of the highway network... Norms of energy consumption and CO2 emissions for the tourism sector.
- Tradeable permits, possibility of tradeoffs within the tourism market, between tourism and other forms of mobilities, between transports and other activities

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