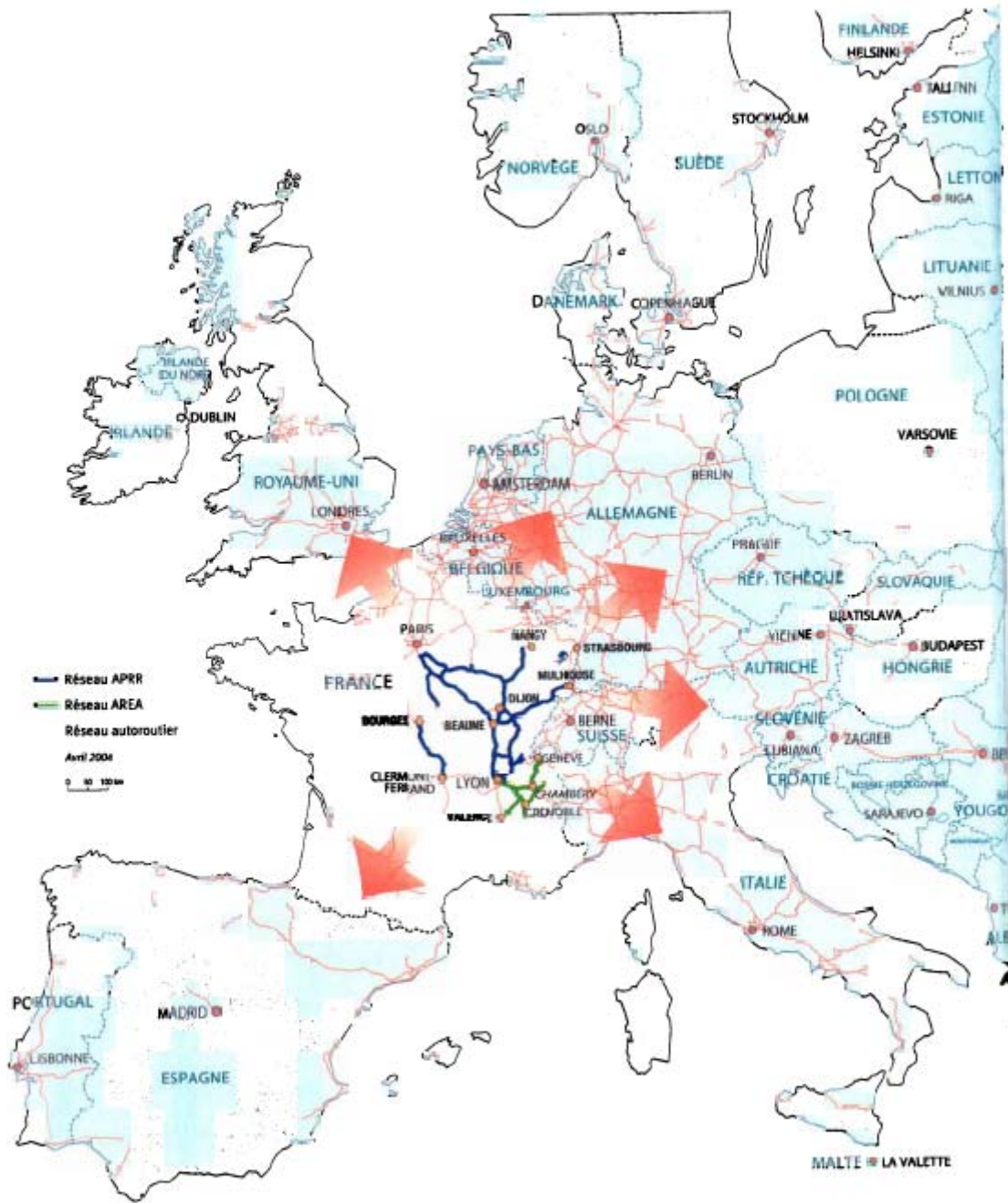
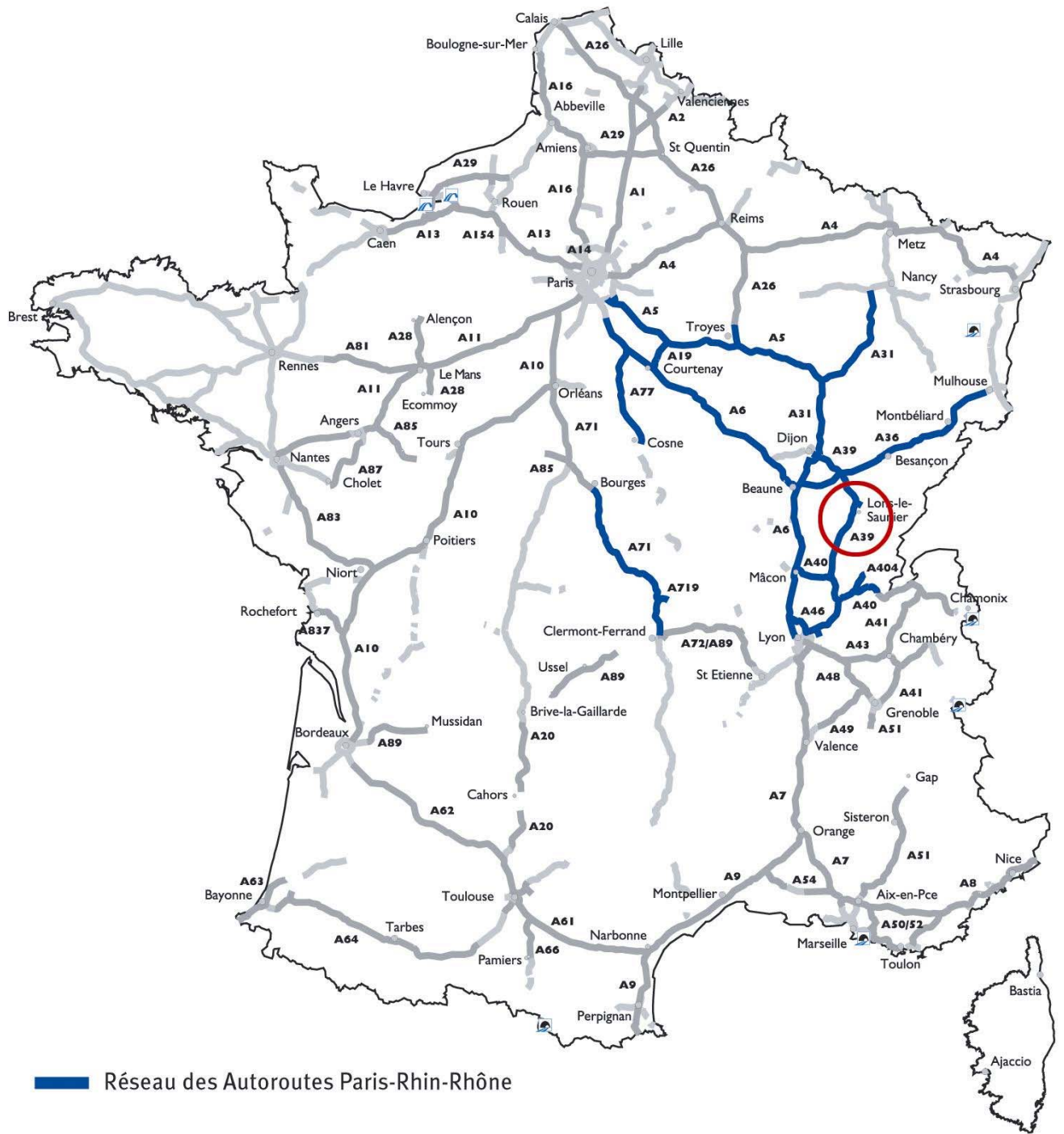


Motorway and local development : experience drawn from studies conducted by the A39 motorway in France over a period of ten years : 1993-2003

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INTRODUCTION:

The Société des Autoroutes Paris-Rhin-Rhône – SAPRR - founded in 1961, is a public company that will shortly offer an equal shareholding to private shareholders, whose business is the construction, funding and operation of toll motorways under the system of concessions awarded by the French government, which issues Invitations to tender on a competitive basis. The company, which has one subsidiary in the motorway sector – the Société des Autoroutes Rhône-Alpes (AREA) operating some 400 km - at present directly operates a network of 1800 km of motorways in France.

Its network forms part of the links between Paris and Lyons (the country's second city), and between Paris and the French borders with Germany and Switzerland. It is the second largest motorway group in France and the third largest in Europe. Its consolidated turnover in 2003 was €1.5 billion, earned essentially from toll income. The workforce of the group totals 4400.

By the 1980s, SAPRR and a number of French partners had voluntarily established "motorway observatories" with socio-economic or environmental/socio-economic objectives, on newly built stretches of road, in order to assess *post hoc* the various local and regional impacts - positive and negative - of the introduction of a motorway on the areas passed through and served.

Three observatories were set up in this way: on the A71 (between Bourges and Clermont-Ferrand), on the A39 (between Dôle and Bourg-en-Bresse) and on the A77 (to the north of the Nièvre as far as Nevers). The latter observatory on the A77 is still operating. The observatory on the A39, which we shall describe in detail, is now coming to an end, and represents a rare and even unique experiment in France and probably in Europe, in that the observations and measurements made related not only to the environment but also to economic activity and local public opinion.

The observatory concerned with the environment and socio-economic effects of the A39 motorway was given six major objectives, as follows:

- to help advance scientific knowledge, in a multidisciplinary or even interdisciplinary approach, of the different local and regional effects of the motorway;
- to generate better answers to the questions and concerns of the different local authorities, including the elected officials;
- to provide better background information in support of local public decisions relating to the construction of the motorway;
- to encourage the different local and regional economic agents to derive greater benefit from the new motorway by encouraging progressive attitudes;
- to monitor changes in public opinion over time: before the commencement of construction, during the building phase, and for several years after the opening of the motorway;
- and finally to contribute to improving future motorway projects.

This voluntary watching brief is therefore more open and more extensive than the mandatory approach required by the 1982 law governing the future direction of domestic transport, which requires (article 14) companies issuing roadbuilding contracts to conduct *post hoc* reviews, in order to confirm that the objectives specific

to the roads being built and set out explicitly in the declarations of public utility made prior to construction have in fact been achieved. Indeed the voluntary work carried out by the observatories tends to improve the quality of the mandatory quality reviews.

A – Introduction to the subject of the observatory and the procedures adopted in practice:

The A39 motorway under observation is 109 km in length, and links two cities of average size: Dole and Bourg-en-Bresse. It serves three départements through five intersections (entering/leaving): Jura, which accounts for 50% of this stretch of motorway, Saône et Loire and Ain. Construction took four years, from mid-1994 to mid-1998. The motorway was opened to service on 4th June 1998, its total capital cost being €655 million, which for France passes as a "normal" cost per kilometre in a level landscape. It did not call for any major special structures.

1°) Three major issues targeted by the A39 Observatory:

When the Observatory was opened, all the partners involved raised three essential questions:

- Does the A39 motorway modify the various ecosystems affected by its introduction, and if so, how and what processes are involved?
- Do links exist – and if so what are they – between a new motorway and the local socio-economic dynamic? Is there any reorganisation of different business activities in the area, are outside companies attracted to the region, and does local wealth creation accelerate?
- And finally, how does the local population react when the motorway is at the planning stage, during construction, and when it finally opens to traffic?

These three questions, and the answers to them, define a particular concrete and pragmatic content for the concept of "sustainable development" applied to motorway projects.

It must nevertheless be stressed that an empirical approach of this type obviously does not reflect the entire significance of the notion of "sustainable development". It represents merely one step along the way, at which environmental, economic and social observations combine together. Current work, in 2004, based upon this A39 observatory, is in fact targeted at a better integration of the three aspects mentioned, and at determining the interrelationships between the fields considered.

2°) Defining the geographical coverage of the A39 study:

Defining the geographical scope of the study raises the problem of the scale on which the various phenomena are observed: a catchment area, for example, does not have the same geographical extent as a labour pool or an urban area (a statistical unit used in France to define an agglomeration). Accordingly an empirical compromise was adopted. Some 417 communes were selected, located at a distance of 20 to 30 km on either side of the motorway, constituting a local area of study defined by a travelling time of up to 30 minutes to access the motorway, including the towns served by it. The total population involved, for this study of the A39 motorway, amounts to 300,000. This observation area comprises substantial wetlands, lakes, rivers and streams, and in fact it is not exposed to the direct and

polarising influence of any major conurbations. Any polarising effect comes from just a few small towns.

3°) An outstanding feature: this observatory has lasted 10 years:

This Observatory was set up at the end of 1993, before construction work began, for a period of 10 years, the final field observations being made in 2003.

The methodology applied is based on the principle of comparing variables over a period of time - about 10 years. This 10-year sequence is also a compromise between timescales that vary according to the fields examined: local public opinion, economic dynamism, and the specific cycles of different biotopes.

There is still a possibility that the observatory may be kept functioning longer in order better to evaluate certain changes that take place more slowly. Therefore the methodological postulate is certainly to be able to compare variables "before" and "after" construction of the motorway.

Three time sequences were defined:

- A short initial phase lasting two years: 1993-1994, with the aim of identifying and quantifying variables not yet affected by construction of the motorway, and providing the basis for the ultimate final comparison.
- A specifically construction phase: 1995-1998, for observing the impact of the worksite.
- A longer phase: 1998-2003, in order to analyse first the effects of the opening of the motorway and, secondly, any changes taking place in the period up to five years afterwards.

4°) The partnership concept of the A39 motorway observatory:

A Steering Committee was set up, with volunteer members representing the organisations that fund the observation studies: the motorway company (SAPRR), the French Ministry of Supply (motorway department - SANDRA), the three regional communities involved, the départements already mentioned, and the relevant public observers from the Ministry of Ecology and Sustainable Development (sections responsible for land-use planning). Two independent scientific advisers (unpaid) attend the meetings of the Steering Committee: one of these is an internationally known environmental specialist, while the other is a university economist. The Committee meets once or twice a year and is responsible for arranging the research programme, keeping it up to date, validating the results submitted, and funding the scientific teams mobilised to complete the studies. A specialist body (CANDE in Lyons) implements the decisions taken by the Steering Committee and verifies the quality of the research carried out.

The work as a whole was entrusted to various university groups (at the Universities of Franche-Comté, Lyons, and so on), located in the area served by the motorway, because of the knowledge they had previously built up in these different areas, but also to private research bureaux, and independent experts. Many disciplines are involved: geography, economics, ecology, sociology, engineering, hydrology, photography, and so on.

It is worth pointing out that the whole apparatus has benefited from the fact that the group of people concerned remained fairly stable over the ten-year period, including

not only the local elected politicians and ministerial officials, but also the researchers and experts (despite the retirement of a few, or occasional local problems encountered). As a result it has been possible to carry the programme through to completion in line with the original intention.

5°) The research programme of the A39 Observatory:

Twenty-six agreements for topical studies were concluded, more than half of them concerned with the environment. The total budget for the studies amounts to €1.3 million over the 10 years, or 0.2% of the total cost of the motorway. The cost is higher if the costs of publishing reports and organising local public meetings are taken into account: these meetings or seminars have been held regularly to broadcast circulate the data collected (in 1993, 1995, 1999 and 2003, and a final one is under preparation for the end of 2004).

The list of studies carried out can be subdivided into three groups:

a) Environmental studies: by regular field surveys.

- Monitoring any changes to the morphology of the bed of a small stream (the Solnan),
- Limnological monitoring in three lakes in jurassic Bresse,
- Monitoring three specific plant ecosystems: the confluence of the Loue and Doubs rivers, a wood (Foullandons), and wetland meadows,
- The effect on the surrounding vegetation of salts used for clearing snow from the road,
- Monitoring fauna: mammals, birds and amphibians,
- Monitoring landscape changes (a series of photographs taken from 250 fixed points over 10 years),
- Measurement of noise levels near the motorway and pre-existing highways,
- Colonisation of motorway embankments by insects (a failure: the only one recorded).

b) Geo-socioeconomic studies: by statistical analysis and field surveys.

- Demographic monitoring of the study area,
- Changes in land use (using the planning standards, and satellite photographs),
- Monitoring the local property markets: volume of transactions with prices (if possible),
- Monitoring land regrouping, farms, and the agro-food chain,
- Analysis of the tourist industry (facilities offered, tourist numbers) and secondary homes,
- Observation of induced economic development: business parks, new businesses, job creation,
- How construction of the motorway has benefited local and regional public works companies, the local job market and local consumer spending: shops, accommodation, and so on,
- Monitoring activities in the towns served by the motorway: street markets, local mobility (residents of the small town of Lons-le-Saunier),
- Monitoring local support policies implemented by the authorities in the region (départements and communes),
- Measurement of fiscal input to local public finances (business tax),

- Study of changes in road traffic: traffic switching from the old highways to the new motorway, and the resulting economic consequences (for garages, restaurants and hotels).

c) Monitoring local public opinion:

- by opinion polls and surveys (questionnaires),
- by reviewing the local and regional press.

A comprehensive summary of all these approaches has not yet been finally prepared but is in hand. We shall therefore give a few particular conclusions hereunder.

B – First lessons about the local effects of the A 39 motorway:

After 10 years of observations made on the A 39 motorway, three fields stand out: they are the geo-socioeconomic consequences, the environmental effects, and the changes in local public opinion.

1°) The local geo-socioeconomic consequences of the A39 motorway:

A number of dimensions are worth mentioning: that specific to the motorway construction site, that linked directly to the operation of the motorway, the one experienced by those using the new motorway, and that induced locally.

- As regards the economic fall-out from the construction site, it has been pointed out that local and regional public works companies secured 45% of the contracts, but only 24% went to businesses located in the only three départements served. In fact a large number of public works companies are located in the départements of Ain and Rhône, which are involved in the economy of the Lyons conurbation.

Prerequisites for local access to the motorway works contracts that are offered on a competitive basis are, firstly, that contractors do exist locally, that the extent of individual works contracts match the capabilities of local firms, that local contractors have sufficient technical experience and are in a position to meet deadlines. It has also been observed that local contractors generally adopt a cautious approach and tend to restrict motorway orders to about 10%-20% of their turnover, in order to avoid suddenly having to take on workers who will be discharged when the contract is completed. However the local public works contractors taking part in motorway construction do in fact benefit from a qualitative organisational effect, and an improvement in their image, turned to account subsequently in other contracts. This qualitative effect is substantial.

- As far as jobs are concerned, the worksite provided employment for the equivalent of 800 persons for three years. However some 70% of these workers come from outside the area and are fairly highly qualified, with only 30% being local employees, who tend to be less qualified, and taken on for a limited period. It is for this reason that the motorway site was not observed to have any effect on the local job market, and local unemployment figures did not fall appreciably.

- On the other hand, local consumer spending by site personnel is not insignificant. It was evaluated at €150,000/km on food and lodging, or a total of 4% of the total investment. These costs are higher for local workers (€1,400 a month) than for the displaced personnel (€1,000 a month).

- As concerns the tax position, some 51 communes received nearly €2 million between 1997 and 2000 in business tax related to the worksite, because they accommodated a stable enterprise centre within their territory.

2°) The direct induced effects related to the operation of the motorway:

- It was found that operating the approximately 100 kilometres of the A39 created about 350 direct jobs, divided between the motorway company (SAPRR), the businesses located at the service areas (petrol stations and restaurants), and also in the gendarmerie. In addition, some of the jobs are offered in rural areas, where they represent a form of diversification that is particularly attractive to women. This number of direct jobs depends on traffic levels: 14,000 vehicles a day on the average on the A39.

- Road maintenance contracts are offered to local firms, particularly for the regular maintenance of grassed areas (embankments, rest areas, and so on) alongside the motorway.

- The final - fiscal - comment is that the business tax paid each year to the various communes the road passes through amounts to €3,000 per km. Since the different communes have different lengths of motorway passing through their territory, their receipts do of course vary.

3°) Impact for those using the new motorway:

The new motorway provides the different users with familiar advantages in terms of journey time, safety and convenience. In France the motorways are 4 times safer than the rest of the road system. In the case of the A39 motorway between Dole and Bourg-en-Bresse, the journey time is 1/3 less than if the motorist uses the ordinary roads passing through the different towns and villages, with their compulsory stops.

4°) Miscellaneous indirect local effects:

- The construction of a new motorway encourages the creation of new business zones, often on the initiative of local authorities such as communes and their federations. This also applies in the case of the A 39 motorway: 12 new business parks, covering a total of 300 hectares, have been developed. Originally, in the area being studied, there were 62 business parks. In addition, the business parks that are less than five minutes from the motorway access clearly become more attractive: these are the ones that can most quickly accommodate new businesses. Although research is still continuing, it has already been observed that about half of the companies moving to the new parks come from the nearby towns.

Thus an acceleration can be seen in the well-known move to out-of-town sites by businesses that go in for modernisation outside the town, frequently by extending their premises. Incidentally, other businesses, originating outside the local area, are moving into these new business parks, as well as firms involved in logistics. Finally, a few companies come from the more rural areas, hoping to benefit from the greater accessibility offered by the new motorway. After all, a company that relocates is a company that is modernising.

- Two départements - Jura and Saône et Loire – have each put up a special building at service areas on the motorway (the Jura and Pouland de Bresse service areas),

hoping to benefit from this “shop window” that sets out their economic and tourist potential. Turnover at each of these two service areas is €10 million, disregarding fuel sales. Moreover, they have created 130 jobs, a third of them seasonal.

- The agricultural sector has benefited from the regrouping and modernisation of farms: 400 farms took part in the restructuring programmes involving 16,000 hectares, of which 10,000 hectares utilised credits from the motorway company – SAPRR - which spent €650 per hectare. The total expenditure on this regrouping exercise was equivalent to 5% of the cost of the new motorway. Also, local authorities are carrying out related projects, such as cutting new ditches, of which 400 km have been introduced.

- The switching of traffic from the highway (RN 83) to the new A 39 motorway has resulted in a loss of income for shopkeepers located alongside the former. An investigation has shown that a transfer of 2000 vehicles (including 1000 trucks) a day was linked to a fall in daily spending in the shops along the highway of about €49,000 (between the small towns of Poligny and Saint Andienne du Bois), and resulted in the closure of restaurants and petrol stations. This phenomenon is a substantial transfer of spending along the highway to the services available at the motorway service areas. However, experience shows that traffic ultimately returns to the highway. In this kind of situation, it may be worthwhile encouraging business partnerships between pre-existing local firms alongside the highway, and those managing motorway services, which operate throughout the country or even internationally. Also, restaurants and hotels located along the highways can invest to improve the quality of their services and thus retain the loyalty of their clients who are using the motorway. Instances of this approach exist in France.

Following this discussion of the economic impact of the introduction of the motorway, we shall present the environmental observations.

2°) The environmental impact of the A 39 motorway:

The environmental effects were observed both during construction of the motorway and after its completion.

a) During construction, as far as fauna are concerned, a kind of differentiation was revealed. Mammals are affected only slightly by the project: they cross the construction areas, leaving their spoor on the ground, and move away from the busy zone. However birds, particularly nesting birds, suffer much greater disturbance. The main reason for this is the destruction of their habitat (old trees, hedges and shrubs) during farmland regrouping and related works. The numbers of hoopoes and various birds of prey have fallen.

As regards amphibians, the toad crossings (pipes) that have a circular cross-section drown the animals (particularly salamanders) in the event of high water flow: it is essential to introduce road crossing systems with a square cross-section, in which water can flow in a more meandering fashion, with less force, producing small islands of sediment, which are used by frogs and toads. However the amphibians are primarily the victims of ruts created by site machinery, for these dry out very quickly. Accordingly, provision has to be made - and this has been done - for replacement ponds, in which amphibians can lay their eggs.

- Again as construction work preceded it, it was observed that lime was entering the lakes under review: this phenomenon is connected with the earthmoving operations. A fall in zooplankton and increased growth of cyanobacteria were noted. However these changes are not irreversible. Nevertheless, in the future, it will be important to be even more vigilant and diligent as regards the collection of run-off water during construction of the road.

- Finally, as regards the landscape, it is important to mention two quite separate factors. First of all, the healing process on the motorway embankments due to plants is particularly fast, as well as in the quarries from which materials were extracted, insofar as the replanting scheme is properly prepared and carried out. On the other hand, the landscape is affected to a much greater extent by the safety equipment and signs erected along the motorway than by the overall route and the road itself. In fact the metal posts and masts (e.g., for the motorway radio) have a lasting impact on the landscape. The SAPRR is considering drawing up more satisfactory special clauses for ordering this type of equipment.

b) After the motorway had been opened, checks were carried out to make sure that the animal crossings introduced (special or multi-purpose crossings) were actually being used by small fauna: foxes, weasels, etc., and by large fauna: roe deer, red deer, and so on. The 13 structures introduced in this way along the routes used by these animals do help substantially to reduce the cut-off and territorial fragmentation effects caused by the building of any road. In the long run, such effects would be disastrous for biological diversity.

- As far as nesting birds are concerned, the observations revealed a contrasting picture. The meadow species and those resident on mixed pasture/woodland are affected much more than the forest species. Thus in the Foullandons woodland area the number of species of birds recovered, after completion of the roadworks, to its previous level. However in the Sevron river valley, the number of species is continuing to fall.

- Looking at the landscape, although it is true that plant healing remains rapid and satisfactory, what dominates the view tends to be the monotony of the landscape as seen from the motorway, in contrast to its previous diversity, when one saw beautiful and poor landscapes in succession.

3°) Changes in local public opinion:

This involves monitoring changes in the views of 300,000 people affected by the new A 39 motorway over a 10-year period.

Three quite separate methodological approaches were used: firstly a survey of the local and regional press, then two opinion polls of a representative sample of people between mid-1997 and the end of 2000, and finally semi-directive interviews conducted in 1994, 1997 and 2000 covering five reference population groups: those living directly alongside the A39 motorway, those living beside its interchange access roads, those living by the RN 83 highway, new residents in communities near the A39 motorway, and people living in the small and medium-sized towns served by the A39 motorway.

The main results of this survey of public opinion obtained in 2000 are very interesting. To begin with, although 32% of the people questioned claimed that they frequently and systematically used the new A39 motorway for their journeys to work or for private reasons, it appears that 41% of those polled said that they never use it. Notwithstanding this result, 87% of people thought that "the A39 motorway is a good thing". Two reasons for this positive view were stated quite explicitly: traffic is improved, and the local image is more modern. Thus in a region that has been opened up by the introduction of the motorway (the Jura), it is interesting to find out that even though a large part of the population does not use it, the public makes a positive link between the terms "motorway" and "modernisation".

It is also appropriate to mention that between 1997 and 2000 the fears being expressed by the public about the possible environmental impact of the new motorway diminished considerably. There is said to be a very high degree of satisfaction about the reforestation and regrouping of farmland carried out. On the other hand, the A39 motorway is seen as generating significant disamenity due to noise in areas that were previously notably tranquil. It is also claimed "that there are always too many trucks on the highway" (this in spite of an observed transfer of 1000 trucks a day to the motorway). Finally, it is considered that the local elected representatives have not shown enough dynamism either in making the most of the business parks newly established near the interchanges, or in promoting local tourism. And these are the people who generally believe themselves to be well motivated (!).

Some conclusions:

In the light of these various remarks about the local effects of a new motorway (A39), it is appropriate briefly to re-examine certain factors in a summary fashion.

1°) Motorway and environment:

Three points can be made at once:

- All in all, no irreversible phenomenon ascribable to the motorway has been observed.

- However the new road does perhaps contribute indirectly to reducing the numbers of vulnerable species of birds, owing to the restructuring of farmland during construction of the motorway. In fact in the A39 zone investigated, a third of the hedges were removed. It would be appropriate to extend the monitoring of this phenomenon specifically in relation to birds in order to verify whether it is in fact irreversible.

It is also essential to draw more operational conclusions from this with a view to safeguarding the most threatened species.

- Finally, noise pollution is greater, and even though it is within the legal noise limits, the population affected feels it badly. Objective noise and subjective noise are not the same. Another field to be investigated and improved.

2°) Motorway and socio-economic development:

It is worth stressing two particular aspects of this question:

- The new motorway does not lead - either directly, automatically, or mechanically – to a local wealth surplus, or to any process of local development. There is no strict causal relationship between the two terms "motorway" and "development". On the other hand, it does seem that local people, in both public and private roles, have an essential part to play in drawing benefit from the motorway. They can adopt appropriate policies, aimed at optimising local potential. But additional action should be taken in order to convert the improved accessibility arising from the introduction of the motorway into a factor of economic attraction. Various interactions then come into play. The motorway is a necessary but insufficient condition for regional development.

- All the same, the arrival of the motorway generates a new local economic geography, with business activities - including the most dynamic - moving into the immediate vicinity of the motorway access points. This is an important fact and it should be taken into account in local urban planning.

3°) Prospects for going beyond the empirical approach specific to the motorway observatory:

A motorway observatory is in fact a collection of empirical local statements. Their contribution to knowledge is significant, but this knowledge remains contingent on the area under observation. In scientific terms, the limits of this type of approach are well known. It is not possible to deduce general laws or to make detailed predictions for other areas. For this to be possible it would be necessary to increase the number of observatories in order to cover a greater typological variety of regions, and to exchange observations using a "benchmark" approach. Models could also be constructed on an intermediate regional scale - but the specific characterisation of the set of people involved would always raise a problem. Accordingly it is probably best to maintain a modest - though scientifically robust - attitude about this question that continues to be part of the discussion about the local effects of a motorway. The terms "motorway" and "sustainable development" will therefore long remain two concepts in tension, ever the source of new technical and professional advances.

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