

## **Key Speakers**

### **INTRODUCTORY ADDRESSES**

Claude GAILLARD, Vice-President of the French National Assembly, Chairman of the Rhine-Meuse River Basin Committee

Bernadette MALGORN, Government Prefect for Lorraine Region (Administrative Officer), Prefect-Coordinator for the Rhine-Meuse River Basin

### **KEY SPEAKERS**

Pierre DARMON : PhD, Director of Research at the CNRS, medical historian

Jacques ANTOINE : Director of CESEM Opinion, Member of the Academy of Water

Manuel PERIANEZ : Psychiatrist

Professor Claude HURIET : Senator for Meurthe-et-Moselle

Thierry MICHELON : Deputy Director, Risk and Environmental Management – Ministry of Employment and Social Solidarity

Bernard BAUDOT : Director for Water – Ministry for Town and Country Planning and the Environment

Professor Henri JOYEUX MD, Cancer Specialist, Montpellier Faculty of Medicine

Jean-Pierre PEINOIT : President of the National Consumer Institute (INC)

Jean DUCHEMIN : Directorate-General for the Environment – European Commission (Brussels)

Professor Annick DELELIS : Lille 2 University, Chairwoman of the Board of Directors of the Artois-Picardie Water Agency

Professor Pedro MARSET CAMPOS : Member of the European Parliament (Spain)

Professor Jean-Marie PELT : Chairman, European Institute of Ecology

## Opening Addresses

Christian MOREL

Communications Director, *Le Républicain Lorrain*

### Christian Morel

Ladies and Gentlemen,

Prior to the Colloquium proper, I would ask you to congratulate the Organising Committee of the Rhine-Meuse Water Agency who, under D. Boulnois and D. Frechin, have worked hard and very successfully.

Before starting on the detailed presentations, I would like to give you a general outline of how the next two days will be run. This morning, we will have several sessions during which the key speakers will address the Colloquium. At the end of each session, you will have the opportunity to ask questions. This afternoon, after a break for lunch, we will start the workshops.

I would remind you that an information desk and a multimedia salon are available where you can access more information on the subject as you so wish.

This evening, as a reward for all your hard work, the Rhine-Meuse Water Agency will be inviting you to a gala night out in a magical, historic site: the Premonstrant Abbey in Pont-à-Mousson.

Having dealt briefly with the practical side, I will now hand you over to Claude Gaillard, Vice-President of the French National Assembly.

**Claude GAILLARD**  
**Vice-President of the French National Assembly**  
**Chairman of the Rhine-Meuse River Basin Committee**

Madam, the Prefect for the Region, and Prefect-Coordinator for the River Basin, our elected representatives, the Chairmen of the Boards of Directors of the Water Agencies, ladies and gentlemen, good morning and welcome to Lorraine. We much appreciate the fact that so many of you have chosen to attend the Colloquium. As Christian Morel suggested, you will be working hard over the next couple of days. We are sure that the workshops will be highly productive, thanks in particular to the contributions you will be making. We come from many different backgrounds and professions but we all have something in common, our interest in water and all that relates to it, the problems it generates and related issues raised by our fellow citizens.

This is why I enthusiastically accepted the proposal by the Water Observatory of the Rhine-Meuse River Basin Committee to organise an international conference on these subjects.

At this stage I would, with your permission, like to express my thanks to my colleague, Bernard Ingwiller for having proposed this capital idea. I thank the Ministry for Town and Country Planning and the Environment for the solid support they have given us. Thanks also to the Chairman, Mr Barthelémy, and his colleagues for organising the Colloquium.

When we first decided to mount this event, the mad cow and foot-and-mouth crises were in full swing. If today the threats posed by these epidemics seem less menacing, they did raise a number of important public health issues and have resulted in higher priority being given to many environmental dossiers, amongst them the management of our water resources. The large number of people attending this Colloquium illustrates the interest you have in the subject and related problems. It is therefore with considerable pleasure that I declare this meeting open. I trust it will be the occasion for extensive discussions over the next two days; we will have ample opportunity to hear our key speakers, analyse many of the problems, exchange ideas, and freely express our opinions on various matters. As you know, the subject we have chosen affects our daily lives in their entirety. I hope that we will use this occasion to have a constructive exchange of views and experiences, given that the problem of water management is inextricably tied to many other issues we are facing.

We decided to take a multidisciplinary approach in this Colloquium. I am convinced we should avoid working in isolation from each other, in a too specialised, "vertical" way, that all experts should have a chance to express their opinions, to listen to each other and exchange views to their mutual benefit. Our experience in crisis management has shown that it is difficult to distinguish and manage all the related technical, economic and psychological aspects of a particular problem when it arises. It is thus extremely important that we do not neglect the preventive side – always a difficult issue – and anticipate threats to public health and to society. Day-to-day news, to which we all pay considerable attention, highlights our uncertainties. We ask ourselves a great many questions. What is the interplay between the different types of pollution, the state of the environment and of our resources? What effect do these relationships have on human health? Do we manage them satisfactorily? Who does what and how? Do international experts spend enough time comparing data? On what do our political, economic and public authority decision-makers base their decisions? Is the public adequately informed? Does the public feel that information is

objective? Is it more worried than usual? Are its fears well-founded? Are there real dangers? Is zero risk attainable? What are the consequences of the "principle of precaution"? How does one assess all risks taken together? These are all questions we should be trying to answer which is why we are determined that this meeting will be productive through its debates and exchanges, and that it will help us improve our water management, our health and our environment.

Like you, as MP and Chairman of a River Basin Committee, I am concerned by these issues, by the discussions taking place within these Water Agencies and by the impact of the Law on Water. In my view as Chairman of a River Basin Committee we have three main roles, but these can be redefined during our discussions:

- ? Plan and organise risk management and prevention;
- ? Act as an interface with the public bearing in mind that the search for solutions requires an accurate understanding of public expectations;
- ? Acquire as much information as possible.

For my part, I feel that we should invariably work in partnership with other related organisations. I have also planned that as a River Basin Committee we will continue examining the points raised during the next two days.

Public health will be a major issue in the years to come, and will have considerable impact on a number of political decisions. The Water Boards will have an important role to play and should encourage contributions from new sciences that at present may well be underrepresented. We will thus be better able to analyse these problems using a horizontal approach. This Colloquium is intended to maintain and encourage a multidisciplinary approach, not limiting ourselves to problems that are specifically technical or medical, regardless of their importance. This is why I am proud to welcome this platform of eminent experts: some forty participants and thirty national, European and international organisations who are working with us. I thank them in advance for coming to the Colloquium and for the quality of their contributions. The key speakers will set the scene for our debates, while the workshops this afternoon will enable us to look to the future in a number of given subjects. Tomorrow morning we will end our work with a round table. I hope that we will conclude the Colloquium by making a number of practical propositions.

In conclusion, I shall be delighted if you are both talkative and concise, imaginative and concrete, clairvoyant and provocative... I declare the debate open. I hope you all have an excellent day.

## **Bernadette MALGORN**

### **Government Prefect for Lorraine Region, Prefect-Coordinator for the Rhine-Meuse River Basin**

As Prefect-Coordinator for the Rhine-Meuse River Basin based in Metz in Moselle County in Lorraine, it is my pleasure to welcome you. This river basin also covers two other regions: Alsace and Champagne-Ardenne. The famous Alsace wines and Champagne from our northern-most regions have added considerably to France's prestige over the centuries. Surprisingly, when we discuss the relationship between water and health today, the existence of these northern vineyards is in fact relevant. In deference to our hosts I would add that Lorraine too is now a wine-producing region. Partly as a result of our agricultural diversification policy, our Moselle wines are acquiring an excellent reputation, as are those of the Côtes de Toul.

To return to our northern-most vineyards, they were in fact our ancestors' highly unscientific answer to the question: Can we drink the water? At the time, as today, many thought it was preferable, if not wiser, to drink wine. From a quality of life point of view I agree with them, though wine is no longer considered a "magic potion". However, our more remote ancestors' consumption of wine also reflected their views on the link between water and good health. Perhaps our present attitude to wine should be seen in the light of this heritage, a direct result of our thoughts on the dubious quality of the water handed down over the generations!

Similarly, we also distinguish between foul and health-giving waters in our place names, another relevant comment from the past. In Lorraine and in nearby regions we are still proud of the quality of our health-giving waters, witness the long-standing reputation of our spas and mineral waters (Vittel, Contrexéville, Plombières, Bains-les-Pins...) that continue the centuries-old use of the iron-bearing groundwater of the Lorraine river basin.

Given the many scientific advances, and thanks in particular to Pasteur's revolutionary contribution, we have become progressively more aware of the direct link between pure water and good health. For many centuries variations in quality were largely local phenomena: water deteriorated following some local event. Incidentally, the war against accidental pollution is still one of our top priorities, and we have highly sophisticated, well proven ways of taking action to deal with such problems.

However, today's diffuse pollution resulting from highly complex processes is more difficult to understand and explain in entirety, in particular for Government Prefects and Mayors who are directly responsible for managing crises and for long-term prevention. But it is these cumulative interrelated phenomena that now lead to risk situations. A momentary or accidental deterioration in water-quality, the result of a leak in a wastewater cleansing system for example, will be quickly discovered given the gastro-enteritis it provokes. On the other hand, when the deterioration is the consequence of a long-term accumulation, it is difficult for us to know exactly which factors have what effect. We can obviously try to eliminate every potential risk. But this is not realistic in intellectual and practical terms given current limits in research, in the means available, in competing priorities for scarce resources, in our ability to fully understand the problems, in our decision-makers' determination on any particular issue, and on the views of the public given that people are becoming progressively more involved in health protection and prevention. It is thus essential that the public understand and agree with the analyses made and the conclusions drawn by

the experts. However, sharing information presumes that we fully understand the problem and can present the issues in such a way that the public understands them. Intelligible communication between experts, decision-makers and the public is thus essential. Nobody has any interest in discussions being limited to arcane arguments between experts, however interesting they may be in intellectual or scientific terms.

Our modern world, with its intense if somewhat incoherent communications, and the increasing priority given to safety and protection presents the danger that if we continue raising the all dangers linked to each action taken in isolation, and all the steps that should be taken to counter them, we could well provoke a loss of interest, and an unwillingness to take action. That would be significantly more dangerous than a conscious decision to accept the risks in the first place. However, this requires that we have adequate control over our all-knowing technocrats and experts who persist in giving *ex cathedra* opinions. On the contrary, in applying the principle of precaution, public decision-makers should take into account both the latest scientific knowledge on the subject and all information on related real life situations.

You can well imagine that as I have to deal with this kind of situation on a daily basis as part of my job, I have a particular interest in information coming from free and stimulating exchanges between different experts, French and non-French decision-makers and our own citizens. We must never forget that the public service is at the service of our citizens. I look forward to hearing all your contributions and bid you a very warm welcome, especially those from further afield.

Christian Morel

We will be returning to the theme of understanding and makes oneself understood throughout the two days.

We will now go back in history to better set the scene for the Colloquium and understand the evolution of pollution.

# Key Speakers

## Pierre DARMON

**PhD, Director of Research at the CNRS, medical historian**

### **Microbial contamination of water around 1900**

Ladies and gentlemen, it is a moving and somewhat intimidating experience to be the first main contributor to address the Colloquium. I will for my part be presenting the historic aspect of the subject that interests us, that is to say, the microbial contamination of water around 1900.

#### **1. The effects of impure water**

At the start of the 20th C, polluted air and water killed some 300,000 people, polluted water claiming 50,000 victims through typhoid and the cholera epidemic of 1892. Diarrhoea, called children's green diarrhoea, was one of the first causes of infant mortality. Amongst related diseases were a number different forms of bacillary dysentery.

The term microbe was first used around 1878. At the time a new form of hygiene was being introduced with the development of serums and vaccines, and the adoption of new practices that finally had a real effect. Until 1880 hygiene was by and large based on Hippocrates recommendations. I know it is fashionable to speak well of the past, but Hippocratic hygiene could be summarised in a few insignificant precautions.

At the end of the 19th C, water was considered pure if it came from a spring, was fresh and clear and had a good taste. Using these criteria, public health specialists declared the water of Laval pure. In fact, the water was full of *Bacillus coli* and bacteria, not because it was impure at the source, but because it had been in contact with seepage from numerous faults in the limestone, from cesspools and water from knackers' yards. The result was that from 1870, there was an increase in typhoid fever, in particular in the areas supplied with water from Laval. In fact, as microbiology had not yet been invented, we knew nothing about these diseases and their link with the water supply. People believed they came from the depths of the Earth. As a result, people even opposed the civil engineering work for the Champ de Mars and for Montmartre hill on the grounds that it would release numerous deadly noxious and infectious vapours.

From 1862 on, a number of public health and town planning specialists advocated a system of main drainage, but main drainage at the time meant draining all waste water into the Seine... and as everyone knows, a river ability to purify itself is limited. In a city with a population of two to three million building such a drainage system virtually condemned the river to death. In any case, by the end of the 19th C, the Seine was a very sick river - out of politeness I will not mention the Thames. Fortunately microbiologists found a solution. Two French scientists, Scöping and Nille discovered

the existence of nitrogen-fixing bacteria capable of transforming nitrogenous material into nitrates. The first biological sewage works were thus built in which wastewater was treated before going into the river.

## **2. Drinking water**

What was the quality of the water supply to private houses? In 1880, each family consumed an average of 12 litres of water. In 1900, during the typhoid epidemic in Paris, it became clear that the areas supplied with water from Laval were hardest hit by the fever. A number of studies were carried out and the conclusion drawn that water from Laval contained large quantities of bacillus coli and bacillus Eberth. Spring water in general became suspect. There was even a widespread "fault phobia" as everyone lived in fear that polluted waste matter would enter their homes through these faults. At the same time the consumption of mineral water took off. It was as polluted as the waters of the Seine however, as tests showed it contained 120,000 germs per cm<sup>3</sup>. In fact, if the spring water itself was pure, the process of collecting and bottling it left much to be desired. Workers' hands were dirty and bottles were recycled without being sterilised, which was more than a simple error as some of them had been used by chemists to collect spittle and urine samples!

The solution was finally found with the invention of sand filters in the early 1890s. In 1892 another cholera epidemic spread throughout Europe killing over 10,000 in Hamburg alone. In the ten years that followed the installation of sand filters the microbe threat was reduced by from 95% to 98%. However, the First World War broke out and all the engineers were mobilised leaving no-one to maintain the sand filters. It was decided to try a different technique that had been known for many years but which the authorities were fearful of using: bleach and chlorine. It was thus that the drinking water problem was finally solved.

## **3. Wastewater treatment**

In conclusion I would like to say a few words on the problems of wastewater evacuation, in particular on cesspools. At the end of the 19th C foul water from cesspools was recuperated and used as fertiliser. At the time, Paris was surrounded by a ring of twenty-two dumps, thus forming the French capital's "faecal crown". They were run by a company called Lessage. Dr Allyre Chassevant calculated that every person in France produced 3.5 kg of nitrogen and two kg of phosphates a year, which for the population at the time represented an income of 200 million gold francs. Faecal matter was thus much in demand as a source of wealth...

Under ideal conditions this fertiliser returned to the earth. At the time it was the best way of disposing of our excreta. But just when the capacity of the area around Paris to absorb these faeces was reaching its limits, and we were heading for disaster, the first biological sewage treatment stations were developed. This was in 1892. From henceforth, the water, having been treated, could be returned to the Seine. We could now start installing WCs!

Thank you for your attention.

### **Christian Morel**

Thank you for your highly evocative presentation which, if I may be so bold, lacked only the smell! Time now to turn to sociology. I would ask Professor Jacques Antoine, former Chairman of SOFRES, to take the stand.



## **Professor Jacques ANTOINE**

### **Manager Director CESEM Opinion, Member of the Academy of Water**

#### **The war on pollution: growing awareness and steadily increasing action**

As a preamble, please note that I am a statistician rather than a sociologist and that I acquired a growing interest in the subject under discussion through the opinion surveys carried out by SOFRES. For more than 25 years I was an expert appointed to the permanent commission on the quality of pre-electoral polls. In addition, I set up a small company that acts as an observatory of public opinion. In the 1990s we noted that people in France were convinced that there is a close relationship between the protection of the environment and limitation of threats to our health. We thus set up a parallel observatory specialising in public health and the environment. At the beginning of the mad cow crisis in 1996 we added a special unit to analyse threats to public health. I have also been a member of the Academy of Water since it was founded nearly seven years ago. Part of the work of this academic body consists in examining subjects in a transversal way. We have thus organised several important colloquiums on the links between regional development and water management.

#### **1. Public health : a major preoccupation**

Everyone in the country agrees that our health is one of our major preoccupations. This may seem an obvious statement but it is important to make the point formally. Remember Vasselot's famous pyramid of needs: health was the basic element. It is a question of living, not just surviving. Public health thus covers a much wider area than the protection of people and property, employment and earnings, or emotional and psychological problems. In addition, in advanced industrial countries, the area covered by the public health domain is steadily increasing. Being in good health no longer means just not being ill, but includes keeping fit and staying young. Popular newspapers are forever featuring these subjects.

#### **2. Public opinion as a factor in environmental and health issues**

In looking at the relationship between water and health, one notes that public opinion is often strong enough to provoke political decisions. Today, patients consult doctors in the Paris area more and more frequently for problems related to bronchitis and asthma, establishing that there is a genuine public health problem. Similarly, the fears expressed by public opinion became an integral part of the problems generated by the mad cow and foot-and-mouth diseases, even when they were not particularly well-founded, as is not infrequently the case. A court case in Guingamp is a good example: consumers sued the local water company for failing to respect the required quality standards. In the first instance the company was found guilty, but in turn sued the National Government on the grounds that it had failed to enforce a number of obligations under the public health laws in particular by the local farmers. The company won its case!

On a concrete level, how does public opinion actually exert its influence? To what extent are members of the public preoccupied by the problem of water? The French Institute for the

Environment has published an interesting book showing that public concern about ecological issues dates back to the 1970s. As I read it, there were three phases:

- ? The first phase followed the two oil crises and was primarily concerned with reducing wasteful consumption. The Rome Club report highlighted mankind's unsatisfactory management of our natural resources. It argued in favour of planned management of our natural heritage, our surroundings being considered as our natural environment.
- ? The second phase, during the 1980s and 1990s, saw an increasing awareness of the links between pollution and health problems. This way of seeing the problem put human beings at the centre of our preoccupations.
- ? Finally, in the last few years, public opinion has shown a deep-seated fear of genetic manipulation, whether it concerns GMOs (genetically modified organisms) or other techniques such as genetic engineering. This preoccupation goes considerably deeper than public health concerns as it involves survival of the human species.

### **3. Water, a resource to be protected**

Our organisation collects and analyses numerous surveys on the subject. The Institute for Nuclear Safety and Protection has established some twenty different types of risk: health, nuclear, road accidents, tobacco... In the last few years the French are becoming more and more concerned about three particular risks, air, water and waste disposal. As concerns water in particular, they are especially concerned about the pollution of lakes, rivers, and seas, and the purity of tap water. When asked the question, *Do you consider that the risks for people in France in general are high, average or low in each of the following areas?* tap water came bottom of the list. In other words, the French have confidence in the quality of their tap water. In the last few years we have also seen growing concern about the effects of nitrates and pesticides on water-quality, in particular for groundwater.

The surveys we have carried out show that, as concerns water, the French are more concerned about quality than value for money. The water market is at present in a difficult situation as prices are rising while the quality stays the same, thus raising a number of marketing problems! Unfortunately the French are not really aware of the effects of unsatisfactory water-quality on their health. It would perhaps be wiser to keep them up-to-date on what we really know and don't know about microbes. The public look at the standards and protest when they are not respected, while in fact they are not aware of the likely consequences in any particular case.

Generally speaking people in France do not think we are likely to run out of water. On the other hand, they are seriously concerned that water-quality will deteriorate. The recent floods have also raised the problem of how to manage water; this in turn refers us to the problem of variations in the climate.

Finally we should note that the people of France have over the last two or three years become aware that farmers and the agrofood industry are in part responsible for the decline in water-quality.

#### **4. The way in which public opinion exerts an influence**

Public opinion acts as an informal pressure group. In addition, the world of consumer and ecological associations has been forced to professionalise its claims and criticisms, having professional audits carried out where necessary.

I would remind you that the Academy of Water has also drawn up a Water Management Charter for developed and developing countries. In the Charter, we insist on the importance of having the local population take part in water management. Finally, a recent European Directive requires that any important measure concerning water be the subject of prior consultation with the people concerned. France clearly has an effort to make in this direction.

**Manuel PERIANEZ**  
**Psychiatrist**

## **The subconscious meaning of Man's relationship with water**

On my arrival this morning, I noted that the *Grand Livre de l'Eau* was in a place of honour at the information kiosk. In the event the first chapter of this magnificent book deals with the questions I intend discussing today.

### **1. Mythical representations**

During this paper I will do my best to avoid literary references and to stick to the purely technical aspects, amongst which I would include "accountancy". Obviously the word "accountancy" is not used in its traditional sense. In our minds, water is linked to the Mother, to the Mother's womb, that is to say, our first human habitat. Having said that, we have covered the essential. However, this is not the main aim of analytical prospection, bearing in mind that if we use that approach we need to justify what we are saying.

I would refer you to a well-known book by Mr Bach that was much appreciated by Lévi-Strauss: *L'index des fables (An Index of Fables)*. In the 1930s, he decided to collect all the folk tales, myths and legends he could discover. (In passing, I would define a myth as the socially accepted basis for the collective subconscious.) Mr Bach finally finished his work the 1960s having traced some 150,000 books of folk tales and legends.

Many of these stories dealt with air, fire and water. Amongst the texts he collected, more than 1,500 had water as the main "character". By comparison, air appears on forty occasions only; it would seem that air was seen as being that critical that it was unconsciously included as part of our anatomy.

### **2. Water and the relationship with the Mother**

As we have said, water is the subject of numerous myths given its relationship with the Mother. A child has, in a creative way, to establish its independence from water as from its mother in order to be fully autonomous. Thus myth treats water as a transitional object, much as the child's relationship with his or her teddy bear,. It is the sound of water that allows it to play this role. In the research I have carried out on sound, water holds an important place, and is always linked to the image of the Mother.

Obviously we could not discuss the relationship between Man and Water without evoking the Mother's womb. As concerns my own work, I am more interested in the separation of the Child from the Mother. When the Mother finally establishes a certain distance between herself and her baby, she "abandons" him or her, to pay more attention to herself. The sound of water in a bathroom is an everyday part of the child's environment; this sound becomes the link between the child and his or her mother.

In addition, in our subconscious representations, the sound of water is often negatively associated with evacuation, and thus linked to the metabolism of the human body. As an example one could cite flush lavatories. For Freud, *"urinating straight symbolises ambition"*. I must admit this leaves me somewhat confused. Water is also associated indirectly with representations of the penis, the phallus. This is linked in turn to our desire to water flowers and watering in general.

### **3. Water and cleanliness**

Another essential aspect is that of cleanliness. Water may incite a defensive attitude or compulsive behaviour leading to an excessive preoccupation with personal hygiene. The relationship between water and hygiene varies from culture to culture even from one region to another. For example, I have noted that in the north of Europe, dish washers are used more often than necessary.

### **4. Learning to speak**

The sound of water is also linked to learning to speak inasmuch as it recalls the pre-verbal stage. Thus all sounds linked to water (fountains, water running away...) take us unconsciously to back to a pre-verbal stage. In this sense music and the sound of water seem to be closely associated.

### **5. An erotic dimension**

For some the pleasure of paddling in water on the floor of the bathroom can be interpreted as a desire to trample on the Mother's body. Water has an erotic and sexual association, in particular during adolescence, when water caressing the body can play an important role. We discover this aspect again when studying water consumption. Surveys I have made show two extreme patterns: one in which water is idolised and another which is miserly. I recently met a family of undersea divers who live in an "aquarium" house: everything has been organised around water: a small stream even runs through their living room. At the other end of the spectrum, some families make a point of not wasting even a drop of water. For example, I met a father who refused to allow his daughter to spend more than fifteen minutes in the shower. As soon as she reached the critical moment he simply cut off the water. At the same time, the father thoroughly enjoyed spraying his daughter's friends with the garden hose when they came by on their scooters.

### **6. Distrust of water**

Another subject we could have discussed is the distrust or fear of water, which would perhaps have been more relevant to our health theme. Unfortunately I have not carried out any surveys on the subject. In any case I imagine it would be difficult to get people to talk about their distrust of water.

I would conclude by saying that politicians have not managed to take Man's subconscious attitudes to water into account in their policies even though they themselves have their own subconscious attitudes.

## IV. Questions

### **Jean-François MÜLLER, Deputy Mayor of Metz**

As Deputy Mayor I would first of all like to welcome you on behalf of **Jean-Marie Rausch**, the Mayor of Metz.

Do you think that there is a correlation between the quality of tap water and bottled water? I would also ask you to comment on the European Directives on the subject. You said that from now on, the public must be consulted before any decision is taken concerning water. This seems to me to be extremely important. People needs to be fully informed, and scientists and politicians have a particular responsibility to give them accurate information. In the future, we must avoid making extravagant promises. Toxicological studies will enable us provide us the public with the relevant information. I imagine we will discuss these questions during the Colloquium.

### **Professor Jacques ANTOINE**

I think that there is a general relationship between the quality of tap and bottled water. This needs to be qualified however as the link is national rather than local. There are numerous theses on the subject. Given that large volumes are involved, one cannot really talk of competition between the two. It is true that the consumption of bottled water suggest that the quality of tap water leaves much to be desired, while objectively the quality of tap water has never been higher.

I would in addition support your views on consulting public opinion. We have far too often had pseudo-consultations done in haste. In my view, this consultation should be permanent. In France we have not yet decided how to put this measure into practice. In 1972, I worked on and published a book entitled *Power and Opinion (Le pouvoir et l'opinion)* where we took as example the consultations in Great Britain prior to the construction of Heathrow Airport. These lasted several months, and in the end the Commission did really take the public's views into account. I have no doubt that public pressure in France will in due course lead to a great many discussions and consultations.

### **Monique CHOTARD, Managing Director CIEau**

To reply to Mr Müller, we carried out a survey on water consumption which showed that 66% of people in France drink bottles water several times a week, and 64% drink tap water. This shows a large rise in the number of people drinking both bottled and tap water.

### **Françoise de BUTTET, Managing Director, Mineral Water Employers Federation**

As I will be addressing one of the workshops this afternoon, I will be brief. I think that we should not see ourselves as opponents. The consumer in France has a wide choice that we should seek to maintain.

### **Sophie DUMÈRY, Medical Journalist**

Mr Darmon discussed the relative cleanliness of water through the ages. I presume that wine, for practical reasons quickly became the chosen drink as it was a healthier drink from a microbiological point of view. On the other hand, Mr Perianez suggested that in mythology, water can be seen in two ways: subconsciously and factually, that we should be careful to separate facts from images.

**Pierre DARMON**

You are quite right in saying that wine was a healthier drink; it was considered cleaner for many centuries. During the First World War, there were a great many alcoholics; they never touched alcohol as such, only wine as clean water was not available. Soldiers in the front line willingly risked their lives to collect wine, but refused to do so for a barrel of water. The authorities at the time tried supplying them with chlorinated water but at the time we did not know how much chlorine was needed for the purification process and the water provided was undrinkable.

**Manuel PERIANEZ**

It is true that in the human subconscious, water is associated with the idea of purity. For thousands of years people and animals considered fresh, clear water as drinkable. One should remember however that chimpanzees filter water before they use it: they pour it through sand before drinking it. It is quite likely that Palaeolithic Man did the same.

**An inhabitant from San Diego, USA**

I have attended a number of colloquiums in France and the USA. In France, if you often discuss mineral, spring and tap water; I have never heard filtered water mentioned. Is it true that it is still forbidden in France? Will you be discussing this type of water during the Colloquium, bearing in mind that it is as pure as mineral and tap water?

**Christian MOREL**

I imagine we will be discussing it in the workshops.

**Françoise de BUTTET**

In fact bottled processed water is not forbidden in France. I will be addressing the meeting on behalf of the packed water industries as a whole this afternoon.

**Jean DUCHEMIN, European Commission**

I would like to come back to the confidence, or lack of confidence that the French have in their tap water. I recently met Mr Messier and asked him why he, as a major water supplier and owner of a major TV station, did not make a greater effort to inform the public. He replied that the tap water used in France was not only used as drinking water. He continued saying that water bottling companies at least made sufficient profit to be able to afford TV ads on his TV station. Nevertheless it would seem to me not only honest but ethical to show the French that their tap water is no worse than bottled water.

**Professor Jacques ANTOINE**

I agree with you. However, some questions preoccupy the consumer in the short term and others only have an impact in the long term. One should separate marketing problems from questions of public health.

**Professor Claude HURIET**  
**Senator for Meurthe-et-Moselle**

## **Why set up an Agency for Public Health and the Environment**

As we have seen, the French are interested in everything that concerns their health. This doubtless explains their growing insistence on higher public health safety standards. To meet these demands, the law-maker has had to look for the optimum available solutions. More than four years ago, on the initiative of members of the French Parliament, a detailed legislative program covering public health safety was started. Note that the basic texts on the subject were introduced in draft bills, not private member's bills. It is important to insist on this point as Parliament plays a role that is often underestimated or even mocked. Please note also that two-thirds of these bills were introduced in the Senate, an indication of the law-makers' determination to satisfy the citizen-consumer's expectations and requirements.

However, the public's expectations and requirements are based on two mistaken ideas. Firstly, the French have the impression that public health safety standards are deteriorating, which is not true. The historical resume we have just heard shows quite clearly that public health standards have been improving over the last few years. The public's other error is to assume that zero risk exists. As we have emphasised earlier, this is an illusion. There is thus a growing gap between the public's increasing expectations and its conviction the zero risk exists with the result that the progress we have actually accomplished often passes unnoticed. I hope that the work we will be doing over the next two days will help enlighten our fellow-citizens.

Here I would like to summarise the main steps our law-makers have taken to make our existing organisations more efficient and coherent.

### **1. Historical resume**

Members of Parliament, including the Senate Social Affairs Commission, started work with an analysis of cellular and genetic therapies. This may seem far removed from the subject we are discussing, but you will see why I would like to develop the point. The Commission instructed me to determine how new treatments could be developed that satisfy two essential criteria: effectiveness and safety. I held a number of hearings on the subject.

I noted, which will not surprise you, that we have a great many expert bodies in France, bodies under various ministries, related to various ministries, and to other public and private bodies all dealing with identical, or very similar subject matter. This multiplicity of bodies was not only costly, but also meant that the initiatives taken were heterogeneous.

In the second phase of my work, I took a closer look at the safety of products for human use. Once again we discovered that a large number of structures reported in greater or lesser detail to many and varied ministries and related bodies. In other words, as you can imagine, the system was neither efficient nor particularly comprehensible. Users were often taken aback by the number of different



bodies. Having established the facts, the next logical step was to decide what to do. It was in this way that the basic work was done that resulted in the Law of 1 July 1998 whose object is to reinforce the monitoring and control of public health aspects of food safety. The public health aspect however was not limited to healthcare and food products; provisions were made for a section on the environment. On 31 March 2000, the National Assembly introduced a bill putting this into practice. This resulted in the promulgation of the Law of 9 May 2001 creating the French Agency for Public Health and the Environment.

## **2. The situation today**

This French Agency has since, through various laws, established a much clearer, more coherent situation. The progress made should result in increased efficiency. As concerns products destined for human use, there are two sections:

- ? healthcare products (medicines, medical and biomedical apparatus that had been somewhat neglected prior to the promulgation of the Law;
- ? food safety.

The Law of 2001 also created the Institute for Public Health Intelligence Gathering (INVS). This organisation is not a public health safety organisation but has wider responsibilities. Working as a network its responsibility is to detect in real time all pathological events that are either abnormal or inexplicable. The Institute will collate facts on such events wherever they occur in France or elsewhere as need be. It will also determine the causes as quickly as possible.

## **3. Critical appreciation**

The Agency for Public Health and the Environment is responsible for risks threatening the environment. Personally, I doubt that the three agencies that I have cited will work together in cooperation despite the establishment of a National Public Health Safety Commission. I will give just one example to illustrate this: The first title of the Law of 9 May 2001 reads as follows: *Environmental Safety, Intelligence Gathering and Early Warning*. I do not see how these three responsibilities can be separated from the very wide responsibilities given to the INVS. If our time was not limited I would cite many more.

This legislation is very recent. In my view the structures that I have just presented represent an important advance over the previous situation and go some way to meeting the public's increasing concern about public health safety.

Nevertheless, the area to be covered is that complex and vast that one cannot blame lawmakers, the government or Parliament if they have not managed to produce the ideal organisation at their first attempt. In other words, this advance, though it is the work of intelligent and enlightened members of Parliament, can still be improved. I am sure that at the end of this Colloquium, you will have made a significant contribution to that end.

**Thierry MICHELON**  
**Deputy Director, Risk and Environmental Management**  
**Ministry of Employment and Social Solidarity**

**Access to drinking water: a major public health issue**

Firstly I would ask you to accept our Director General, Mr Abenhaïm's apologies. He is unable to attend and has asked me to represent him. I will be presenting the paper he prepared.

It is a great honour for the Ministry of Health to be invited to take part in this Colloquium. In fact water and public health have always had a special relationship. Historically it was questions raised about the safety of drinking water that led to the formation of the Antigenic Movement in the mid-19th C. Even today, access to drinking water remains a major issue. In the past, the expansion of public water supplies in France significantly improved public health and allowed our cities and colonies to grow. Today we require vast quantities of water: every inhabitant consumes an average of 200 litres of water per day. While access to a public water supply is now taken for granted in France, it is important to remember that this is not the case everywhere in the world. The United Nations estimates that more than 2 billion people have no access to uncontaminated drinking water, 1.5 billion have no waste water cleansing system, and more than 10,000 children die every day from diseases linked to the consumption of contaminated water.

**1. Reduction in the incidence of water-borne diseases and epidemics**

In the West today water-borne epidemics such as cholera and typhoid have virtually disappeared. Taking the 1860 figure as 100, the incidence of typhoid had fallen to 10 by the 1920s. By 1945, progress in curative medicine had reduced the mortality rate in the remaining 10 cases to 2. This success is due in particular to the major effort made by the Government in introducing regulations and testing, by providing financial grants, and more recently to the increasing food safety role being played by the European Union.

Nevertheless, we will never be able take pure water for granted, and the slightest *laissez faire* will have dire results in the very short term. Studies show that 10% to 15% of the cases of acute gastro-enteritis in France are linked to the consumption of water. Elsewhere in the West, water-borne cryptosporidiosis epidemics have hit many thousands in recent years: 13,000 in 1987 in Carrolton in the USA, 9,000 in Japan in 1996, 403,000 in Milwaukee in the USA in 1993.

**2. French regulations to ensure a satisfactory drinking water quality**

The Decree of 3 January 1989 is the basis of French legislation providing for regulations protecting the quality of drinking water from its original source to the end-user outlet, including all intermediate steps: treatment, storage and distribution.

The main provisions in the Decree are well known: it sets up protected areas covering watersheds, requires that FELTEN issue prior authorisation for the use of any resource and of all water

treatment companies, controls the authorisation of water treatment products and processes, sets regulations governing the construction of water distribution works and quality of the equipment used in transporting water, and finally lays down more than sixty quality parameters to be checked at the end-user outlet. By comparison, in the early 1900s, the regulations insisted on only five parameters.

The second key element in France is the system for enforcing the safety regulations for drinking water for public use. This is carried out by 1,500 DDASS (County Health and Social Security Department) engineers and technicians. They examine requests for the approval of new water collectors and the protected areas around them, regularly visit public water pumping, treatment and storage stations, and analyse the quality of the water supplied to the public. In France as a whole, regular checks are made on more than 32,000 water collectors fed by surface and groundwater. Every year more than 320,000 water samples are taken, resulting in some three million quality tests.

### 3. New lines of research

The various assessments made over the last twenty years show that water-quality is improving steadily and that almost all water distributed is of satisfactory quality. In the first report submitted to the European Commission, the level of conformity with European standards was 96% for nitrates, 94% for aluminium and 98% for bacteriological indicators. All toxicity indicators, covering chrome, mercury and lead, met the required standards.

Further improvements must nevertheless be made to ensure we satisfy all quality parameters, in particular those for nitrates, pesticides and other microbiological contaminants. For the Ministry of Health the action we are taking on water does not end there. As proof I will cite a few matters that are currently being examined by experts.

#### ? Legionella legionellosis

The increased monitoring of legionellosis in recent years has led to a net increase in declared cases (up from 50 per year in the 1980s to 600 last year), and the incidence of more and more epidemics. The French Public Health Safety Council (*Conseil supérieur d'hygiène publique*) is about to submit a report on risk management in legionellosis. It will give a list of all circulars available on the subject, in particular those laying down the rules to be respected on prevention and monitoring, especially in hospitals and related establishments. In the near future, these provisions will be reinforced by regulations prepared jointly by several Government Ministries.

#### ? Aluminium

Several epidemiological studies have suggested a correlation between the presence of aluminium in drinking water and an increased incidence of Alzheimer's disease. As other studies have given conflicting results we have asked AFSA (French Food Safety Agency) and INVS (Institute for Public Health Intelligence Gathering) to submit a joint expert's report on the matter.

#### ? Chemical molecules dispersed in the environment

Amongst others this concerns chlorophenols, pesticides, polycyclic aromatic hydrocarbons... There is some evidence to suggest that these elements are carcinogenic or mutagenic in the long term. The 1998 European Directive on water for human consumption requires that tests be carried out to check for their presence. Particular attention must also be given to endocrine disrupters. A scientific intelligence gathering service is required to continue assessing the health risks raised by these products.

#### 4. Reinforcement of public health intelligence gathering

My main objective is to improve public health safety. Various studies have shown that a number of epidemics in North America were linked to the consumption of water that meets regulatory bacterial indicator standards but in which protozoa were present. As I mentioned, 10% to 50% of acute cases of gastro-enteritis are attributable to drinking water. We thus need to ask whether the indicators at present used in drinking water management should be changed, especially given the large increase in the population at large under immunosuppressant medication. This is why the Institute for Public Health Intelligence Gathering has been instructed to monitor the risk inasmuch as it affects drinking water. The controls will use water purity measurements as indicators of exposure to pathogenic germs, and investigate water-borne epidemics and operating accidents.

The introduction of new policies on the use of chemicals in agriculture, the improvement of our knowledge of traditional contaminants, techniques for monitoring the environment and public health hazards, and the introduction of new analytical methods, all raise a number of questions, in particular concerning the precise risks represented by the contaminants measured. We have fortunately set up bodies of experts at a national and international levels to meet the rise in public concern about environmental health. On an international level, one should also note the imminent creation of the European equivalent of the AFSA, namely the European Food Authority which will make a significant contribution to risk assessment in particular concerning drinking water. On a national level, the recent Law of 1 July 1998 is helping rationalise the work done by the numerous expert authorities dealing with public health safety in France. It set up the National Public Health Safety Commission to coordinate the scientific policies of the various public health safety bodies. For water, these bodies consist of the Institute for Public Health Intelligence Gathering, the French Agency for Food Safety, and more recently an organisation that I think will play a growing role, the French Agency for Environmental Public Health Safety. This Agency, set up by the Law of 9 May 2001, will have a federating role to play for all the various bodies dealing with the environment in France.

Finally, a new Decree is being prepared to transpose the European Directive of 3 November 1998 into French law. It will make important changes in the way in which French regulations are introduced, at present under the Decree of 3 January 1989. The main changes will be:

- ? The conformity of drinking water with regulatory standards will now be determined at the domestic tap; this will require an intelligent split of responsibilities between the water distribution company, the owner of the property concerned and the Government Prefect (Administrative Officer);
- ? The non-conformity of water with the given limit values will be tolerated in strictly controlled situations (derogations will be granted for certain chemical parameters for a maximum of three years renewable twice. These may only be granted by the Prefect provided he/she can establish that they pose no public health threat, that the public is informed, and that it can be shown that no technical means of satisfactorily treating the water exists);
- ? The introduction of new test standards for water (In new standards the following will be monitored whether or not they are included in the 1998 Directive: bromates, trihalomethane, radioactivity, cloudiness, chlorates, etc).

In addition, standards will be raised for certain parameters. Thus the threshold for lead and arsenic will be reduced from 50 mg to 10 mg per litre.

Making sure the water supply is in conformity within the time allowed in the European Directive will require large-scale research, the availability of uncontaminated water resources, the extension of existing treatment lines, and the progressive replacement of four million lead pipe circuits.

## **5. Conclusions**

In spite of the extensive progress already made, we will have to continue making an effort to improve water-quality, as for example the bacteriological quality of water from small distribution units, the modernisation of treatment lines, the introduction of preventive measures in the light of the established risk of accidental pollution, and an improvement in water distribution management. In addition, while improvements in our expertise and in public health intelligence gathering suggest that we can today drink tap water with no significant risk of serious poisoning, they also warn us that water can have effects on human health that are more difficult to detect at an environmental level. This is why we must continue improving our expertise, establishing new techniques for monitoring public health and the environment, and adding to our regulations and controls as soon as our knowledge of any particular new contaminant is sufficiently advanced. There is considerable work to be done that will require close collaboration between the relevant departments in the Ministries of Health and of the Environment. They share the same objective: to protect the environment, and thus the consumer.

**Bernard BAUDOT**  
**Director for Water**  
**Ministry for Regional and National Development and the Environment**

**Is zero-risk possible?**

The Ministry for the Environment's main preoccupation is environmental safety, that is to say, ensuring the protection and preservation of the quality of water as a natural resource, and maintaining life and an intelligent equilibrium in aquatic milieu. The latter objective has an impact on water-quality in general and thus on the costs of water-treatment.

**1. A satisfactory water-quality**

As has been mentioned by the other speakers, the quality of water in France is good. The incidence of water-borne diseases is low, especially if we compare it with similar figures elsewhere in the world. In fact water-quality is not even satisfactory throughout Europe. In London recently, the Ministers of the Environment signed a protocol with the United Nations Commission and with the WHO's European region to help preserve water-quality in the countries of Central and Eastern Europe. As Mr Michelin remarked, we have to maintain standards.

In France, almost all users are connected to public distribution networks providing satisfactory quality water. Monitoring the quality of this type of water raises no particular difficulty. On the other hand checking environmental water-quality raises several problems. It is clear that environmental water suffers a range of diffuse contaminants such nitrates, phosphates, pesticides, medicinal substances, etc. We have considerable difficulty in detecting these substances whose effects are superposed. We are concerned that over time, water treatment costs will have to rise significantly.

**2. Lines of research and prevention**

The Ministry for the Environment and Town and Country Planning has two main lines of research at present:

? Diffuse pollution

For the moment we do not have sufficient data, in particular on pesticides whose molecules are becoming more and more hydrophile. They thus penetrate the soil and reach the groundwater table, a strategic resource for the future generations' water consumption. We must make a serious effort to determine the interactions between the various molecules, and the persistence of different particles.

? New types of contaminants

We are now working on four types of contaminants that may have an impact on health and the environment: endocrine disruptors, medicinal substances, toxic algae and classified infectious agents.

### **3. The evolution of pollution**

#### *a. Surface water*

To measure changes in the concentration and accumulation of various substances in water, a network of sampling points requiring specialist know-how is required. In France we have achieved a satisfactory level with 1500 surface water sampling points managed by six water boards. Over the last twenty years we have recorded a net improvement in water-quality in the major water courses, all the more so as significant investment was made in improving water treatment for certain types of contaminant (oxidisable matter, reduced nitrogen, phosphorus...) This improvement is the result of the steps taken by local and regional authorities through the water agencies, and by the National Government.

However, the incidence of diffuse contaminants remains much the same and new contaminants are being found. We nevertheless have a wide range of facilities for monitoring surface water. It is extremely important that we acquire as much knowledge about water as possible so that political decision-makers and Government services can take the best possible decisions and keep the public well informed. To date, information on water remains relatively confidential, being limited to professional and semi-professional circles. Over and above the Framework Directive, we must make an effort to better inform the public on water-quality, and give them various means of comparison. In other words we must keep the public better informed and be more open to discussion. This is one of the Water Department's priorities. This presumes that we make reliable data available to networks that cover the country as a whole.

#### *b. Groundwater*

The situation is much more difficult concerning groundwater, and the work required more complex and onerous. The Regional Offices of the Ministry of the Environment and the Water Agencies have already set up a network on the subject. At the moment however we have only 450 sampling points while we actually need twice that number. We need to reinforce these networks to ensure that our drinking water resources are preserved for future generations. The European Parliament has insisted heavily on this point – I am sure that Mr Duchemin, the European Commission's representative will raise this point again.

The Water Department, in collaboration with the Ministry of Health, is setting up a national groundwater databank that will be operational by next autumn. We must then continue adding to the data to optimise our global evaluation of water-quality. This data will also be available to users, in particular via the Web. However, we need to allow for the fact that the public are not specialists and will not necessarily understand the more complex technical data.

### **4. Human health and the environment**

The links between human health and the environment are multiple, being both direct and indirect, short-term and long-term. We have to ensure that we do not create any serious imbalance in our

ecosystem, in particular through poor waste disposal. The Member States' Commission has carried out some interesting research in the matter. The 1998 Directive drew a distinction between drinking water environmental indicators and public health indicators. The 2000 Directive sets Member States a number of highly ambitious objectives aimed at improving the quality of water, that is to say attaining target quality surface water in chemical and ecological terms, and sufficient quantities and a satisfactory physico-chemical state for groundwater. For your information, I would remind you that **if 96% of water catchments in France exploit surface resources, 94% of the groundwater provides 66% of our drinking water**. The issue is thus extremely important. The implementation of the Framework Directive will require considerable hard work. As part of the new water bills before the French Parliament, one of them translates the Framework Directive into French law. However, we still have to decide on the methods to be used, the data required, the management plans, and the means to be allocated to implement the Framework Directive.

In conclusion, I would like to thank the Rhine-Meuse River Basin Agency for having organised this Colloquium, in particular as it is of considerable interest to the public. I congratulate the various teams for their hard work in acquiring considerable knowledge and data on the subject; this Water Basin Agency has an excellent record in that respect. I am also convinced that, if after ten years hard work we have succeeded in significantly improving water-quality in our river basin it is largely due to our determination, and to the regional water preservation policy we implemented in cooperation with the Lorraine Chamber of Agriculture and the Mirecourt INRA. However, we are working towards long-term objectives and will have to remain forever vigilant.



**Professor Henri JOYEUX**  
**Cancer specialist, Montpellier Faculty of Medicine**

**Water and cancer : the role of xenohormones**

First of all, I would like to thank the organisers of this very interesting conference for having invited me here today. You have before you a very worried oncologist because anti-cancer centres are busier than ever and the perspectives of finding a treatment for cancer are not particularly bright. This is why prevention is an important aspect of oncology.

The water is a subject of particular interest to oncologists today given recent, original research findings concerning xenohormones. These are foreign substances that have hormonal effects if absorbed by the body. They are toxic to Man in the short-, mid- and long term and are present in water in the form of environmental contaminants. Our priority is to explain these hormonal effects on the human body from the symptoms they induce. In the short term symptoms may be similar to those of allergies; in the mid-term they may take the form of chronic allergies and serious diseases that are difficult to treat. In the long-term, they may take the form of skin or hormone dependant cancers. The number of breast cancers in France multiplied fivefold between 1975 (7,000 new cases per annum) and 1995 (35,000 new cases per annum). Similarly, prostate cancers in men are increasing regularly.

Under this heading we also include other types of cancers such as those of the respiratory, gastrointestinal or lymphatic systems. To give you just one example: the first xenohormone used in therapy was diethylstilbestrol. When used at very low doses this substance helped maintain pregnancy. However, even at homeopathic doses the effect was dangerous. By 1971 the product had become a veritable poison in the US. A scientist discovered that DES could induce cancer, not in the mother who had used the product, but in the child between the ages of 11 and 22. It was only six years later that the product was banned in France when it was found to cause urogenital malformation in small boys and girls, and was also found to present a risk of vaginal cancer.

Other aspects of xenohormones are also manifest: today we are well aware of the hormonal effects produced by certain plasticisers used in food packaging, washing powder sulphates, herbicides and fungicides, organochloride pesticides, etc. Given that xenohormones are also used by the millions of women taking birth control pills and under hormone replacement therapy (HRT) it is not surprising that they are found in waste water. Other products also contain xenohormones: oestrogen sulphates found in non-pasteurised cow milk, growth enhancers in cattle feed (routine use banned in France), etc. When these products spread to wastewater they can have highly toxic effects.

From a scientific viewpoint, the action mechanism of these xenohormones is extremely interesting. For example, organochloride pesticides react directly with receptors and displace other molecules, inducing damaging effects. The combination of the pesticide and the receptor may displace illegitimate activators likely to trigger cancers.

In order to combat the damage caused by xenohormones, a healthy diet is essential. Certain food containing plant hormones has an inhibitory effect on the estrogenic activity of pesticides. A typical

Mediterranean diet (four items of fresh fruit and four vegetables daily, olive oil, sea food, fish, goat and ewe cheese) provides an interesting solution. White meat, green tea and a daily glass of red wine are also recommended.

The patients we see today regularly ask two questions:

- ? What should we eat?
- ? Where should we buy our food (products from traditional farming, planned farming or organic farming)?

I have often asked myself the same question. The Montpellier Cancer Institute has set up a program to compare the nutritional qualities of food products coming from traditional farming, planned farming and organic farming. In most cases, we have observed that foodstuffs produced by organic farming have more positive micro-nutriments than those from planned and traditional farming.

To date, a number trials are underway, in particular trying to explain the increase in hormone-dependent and urogenital cancers. These trials are also researching the decrease in male fertility. Certain abnormalities, so-called "birth defects" are not genetic at all, but have been induced by treatments given before or during pregnancy. A European enquiry is planned to identify the polluting agents to which a gestating mother is exposed and to relate them to defects observed at birth.

In order to prevent xenohormone activity, they must first be detected. It is impossible to ban all the products containing these agents. We have been told that by 2005 the *Environment Protection Agency* will be assessing the oestrogen-mimetic activity of 35,000 products. This seems utopian in my view but we need our dreams to make progress!

A study on turtle sex differentiation has been carried out to detect xenohormones. Turtle eggs incubated at a temperature of 26°C produce males, while eggs incubated at 31°C produce females. The sex of turtles can be modified by introducing estradiol. It is thus possible to establish a product's geno-hormonal activity.

In Florida, the first noticeable biological effects of organochloride pesticides on alligators and turtles have been observed in the atrophy of the penis and testicle malformation. In April 1999, the testicles of male fish caught in the Seine estuary contained female sex cells. Is this a result of pollution caused by products containing oestrogen mimics (plasticisers, detergents, pesticides) or by so-called natural hormones which are in reality synthetic hormones such as those found in human urine evacuated through the drainage system? We are facing important questions for which we have no answers at present.

To conclude, I should like to quote the Nobel prize winner, Jean Dausset, President of the Academy of Water: "*Access to pure water for everybody should be an indefeasible right*". I suggest you now consider the following question: What exactly is pure water ?

**Jean-Pierre PEINOIT**  
**President of the National Consumer Institute (INC)**

**What the public expects**

I would firstly like to thank you for inviting consumers to give their point of view, bearing in mind however that I will today be talking less as President of the National Consumer Institute, whose actions in the field of water are relatively limited, but as representative of a network of consumer associations, the most active of them being *UFC Que Choisir, CSCV, Familles rurales...* One should also not forget those recently formed associations whose main preoccupation is water. We should also not turn a blind eye to the fact that some of them have been taken over by political parties, water being a political issue on occasion!

**1. Different aspects of the problem**

I would today like to talk to you about several general points raised at the World Water Day last 22 March:

- ? Public health aspects, several million children dying every year from lack of water or from drinking contaminated water;
- ? Economic aspects bearing in mind that all consumers do not have an equal access to water;
- ? The social aspects of water, some consumers discovering that they cannot afford to pay their water bill;
- ? The future of Humankind, the scarcity of water on a world level could become a real risk or provoke conflict, as many of the 300 largest groundwater resources and rivers straddle several countries.

Given this situation, Governments and public authorities must find a way of better managing our water resources.

**2. Water services**

*a. The public water supply*

I would remind you that our water supply is a public service even when it has been delegated to private companies.

Consumer associations have not taken a dogmatic position on the issue. We are nevertheless often questioned on the subject by other countries where the water supplies are at present municipal and proposals have been made to delegate these services to private companies.

The price of water varies throughout the world and even in France. The average price is of the order of FRF 17 to FRF 18 per m<sup>3</sup>, but inquiries realised by consumer associations show that prices may vary from area to area by a factor of one to seven. In our view, the Government should consider ways of reducing this difference so that people are treated more equitably. I will not discuss the issue of service continuity other than to say that the operator must provide a service without interruption, except in cases of force majeure. Integrity is also an important issue in the consumers'

view. They consider that the operator should modernise the plant and equipment, updating the technology used as available. I will also not discuss the different systems of management with which you are all familiar. In any case we are keeping a careful eye on current changes. The fact that some private operators are in a position to make large-scale investments raises a number of questions.

In France there are 600,000 km of piping and 120,000 km of junctions. How are consumers informed concerned the internal cleaning of these pipes? What are the possible effects on human health? Regrettably, such subjects are never raised. There are obviously many others on which the consumer would like to be given more information.

#### *b. The place of private operators*

Some 55% of municipal councils, providing 75% of all drinking water supplied in France, have delegated their water supply services. Those that manage their own are largely small municipalities. The proportion has not changed significantly in spite of pressure by the public, the elected representatives and Regional Audit Offices. Some councils have renegotiated their existing contracts, some have changed operating company, in both instances winning lower prices. A very few councils have resumed management of their water supplies. Lastly some councils have taken legal action against their operators. Whatever the case, it is clear that the renewal of a water supply contract is a key moment. Councils are becoming more and more demanding with the result that prices have fallen an average 9%. This change is all the more interesting given that the number of contracts to be renegotiated will increase steadily (from 500 to 600 per annum today, to 2,000 to 3,000 in the years to come). In our view consumers should be involved in these renegotiations.

Finally, I should inform you that I do not share the enthusiasm shown by some as to water-quality. We have established that in some regions, in particular where intensive agriculture is practised, the quality of drinking water has deteriorated. I imagine that the people of Brittany would be somewhat surprised if you told them the quality of their water was improving! If the standards in that region are still more or less respected, this is only because the local water is mixed with purer water before distribution. We should in fact be worried about water-quality. As an aside, one should note that more and more consumers are drinking bottled water, tap water being considered suspect

### **3. The consumers' main requirements**

I do not need to repeat that all people in France want access to water. They consider that being supplied with water of satisfactory quality is a fundamental right.

#### *a. Making information readily available*

When a municipal council grants the water service to a private company, it is important for individual consumers, consumer associations and the municipal council to have ready access to a wide range of information. We feel that the consumer has the right to know the amount of water he/she consumes, in particular as this partly determines his water bill. Unfortunately, many households, in particular in municipally-run housing do not have water meters. Consumer associations insist that every individual dwelling to be fitted with a water meter. I would remind you that this is on occasion still not the case in new housing. It appears to us that this will be an essential factor in encouraging responsible behaviour by the public as concerns water. Similarly we consider that every consumer should have his/her water bill, even where he/she lives in municipally-run housing.

As an association we want all matters relating to water service management to be more open. There should be no transfer of funds from the municipal council's general budget to the (public or private) water service. Similarly, questions concerning water-quality and the choice of the water company should be clear and above board. As concerns water supply contracts, we feel they should be for limited periods only; I believe the water bill before Parliament includes this provision. In addition, water supply contracts should include a yearly cancellation option or clauses enabling the contract to be renegotiated.

Some associations feel that water supply contracts should only cover management of the service. They feel that major investments, for water purification stations or extensions to the network, should remain under the public authorities' control. We could thus avoid the price of water doubling or even tripling as has happened in some municipalities. It would be useful if the possibility of granting subsidies to local authorities could be included in a coherent overall plan. I gather we will have the opportunity of discussing such a plan during this afternoon's workshops.

Whatever the case, it is important to allow for the water supply system management to be changed, i.e. for municipalities to farm out their water supply and take it back again.

#### *b. The need for consultation*

The Law of 1992 set up consultative commissions for local and municipal services. The commission should normally bring together representative organisations in the area concerned enabling them to discuss the services with their elected representatives. However, this provision has not been implemented for the last nine years, the responsibility being entirely that of the elected representatives. We accept that the provision may raise problems in very small municipalities, but it is clear that it could easily be applied even if only at an inter-council level.

#### *c. Improving information*

This point has already been raised so I will say no more.

#### *d. Assessing the quality of the service*

This requirement raises a number of points:

- ? Specific standards should be applied to all operators whether public or private;
- ? Certification of a water supply company should include registration of the service enabling an independent body to check the standard provided;
- ? Precise objectives should be defined and agreed;
- ? Performance objectives should be established to ensure operators meets the required standards (pricing could be two-level: users being billed for their consumption plus a management fee payable to the operator on condition that it attains the given objectives. In the event that the objectives are not respected, the company should be subject to financial penalties).

We feel that our elected representatives should assume their responsibilities regardless of the electoral cycle. We note that the re-negotiation of water supply contracts almost invariably leads to a reduction in the price of water, for example by 49% in Le Baule and by 25% in Quimper....

#### **4. Conclusions**

In general water supply in France is a public service that has been delegated to one of three large private companies (Vivendi, La Saur and Suez Lyonnaise des Eaux). Consumers have every reason to be concerned at these companies' international growth and the increase in the number of services they are providing that now cover many aspects of ordinary peoples' lives (construction, heating supplies, communications, telephony...) We feel our elected representatives should take careful note of this situation and at least keep the public informed about the growth in these large international groups that for a number of consumers are fast becoming their sole interface. We feel this subject should be raised for public discussion.

## **Jean DUCHEMIN**

### **Directorate General for the Environment, European Commission, Brussels**

#### **European water policy**

Given that Europe as an organised body is still young, its water policy is also in its early stages. Fifty years ago the European Community, then consisting of six countries, was more an economic than a public health organisation. Protection of the environment was not mentioned in any treaty until 1987. Nevertheless a number of action programs were implemented and directives issued concerning the use of water. These actions were mostly introduced by the environmentalists, but this did not exclude public health or other human aspects. They generally had both public health and **anthropomorphic** objectives. The directives dealt with surface water, **still** water, bathing water, dangerous substances, water for fishing and shellfish production, groundwater, etc.

Since 1987, the environment has been one of the European Union's priority areas. The Commission has the European Parliament's support in all these actions.

I would remind you that decisions taken in Brussels are a result of decisions taken by the Council of Ministers of the Member States on propositions made by the Commission. Today the European Parliament often has codecision-making powers in matters concerning the environment.

The Fourth and Fifth Action Programs encouraged the inclusion of the environment as area of concern; human beings have thus become an environmental priority.

The second wave of directives on water went beyond water use to prevention at source. Directives on waste water, on diffuse pollution, on industrial pollution and pesticides were issued. As concerns pesticides the Directive insisted more on prior approval of the molecules than on their effects on the environment.

The pesticide problem is general and is not limited to tap water. Thus the use of fertiliser and chemical nitrogen has risen significantly, from 1.5 million tonnes at the end of the Second World War to 10 million tonnes today. The fertiliser industry hopes to see this figure remain at around 9/10 million tonnes, but we would prefer to see a reduction of 20% to 30% which is quite feasible without reducing yields. The intensive use of fertiliser has led to a significant degree of eutrophication: today whole areas of our waters are dead, the former rich plant life having been replaced by filamentous algae. Once oxygen production has been reduced to zero, nothing will grow. If we remember that the North Sea was once one of the richest fishing areas in Europe, one gets an idea of the size of the problem. Measures obviously have to be taken at a European Union level. Mr Michelon spoke of the risks linked to toxins: this is as true for our salt water as for our fresh water seas. Nitrogen and phosphorus are the main causes of this eutrophication.

The European Directive on nitrates requires that analyses be made of waters at risk, calculating the rate of increase in legionella (threshold 50 mg per litre) and the degree of eutrophication. However this does not take into account the fact that although rates below 50 mg do not pose a threat to

human consumption, the equivalent standard to protect ecosystems would be one tenth of that figure. Generally speaking Member States have not publicised these limits widely. In fact, the extent of each threatened area needs to be established, action programs mounted, and follow-up reports submitted every four years. These recommendations are close to the thinking behind the Framework Directive which deals both with eutrophication and various chemical and microbiological problems arising from the discharge of wastewater.

#### *Map showing threatened areas*

In France, important work has been carried out by the Water Agencies. This has resulted in a significant improvement in the quality of bathing water: ten years ago, 20% of such areas were unfit, today this has fallen to 10%. The same applies to freshwater areas. This improvement is largely due to the extension of main drainage systems and the treatment of sewage. For your information, the Bathing Water Directive now takes into account both the microbiological quality of the water and the related **upstream** health risk.

To conclude, a few words on the Maastricht Treaty: this introduces the concept of sustainable development, makes the environment an integral part of European policy-making, introduces the principle of precaution, of prevention at source, and the polluter-payer principle. Prior to 1999 the European Union could not attack Member States for failing to apply its directives, but this is no longer true. In my view, although this is an interesting advance, the measure should only be used in the last resort.

The Treaty of Amsterdam introduced the principle of codecision-making and more intensive cooperation between Member States who so choose. Today as a result, after more than five years preparation, the Framework Directive is to be issued. Amongst other matters it requires:

- ? Sustainable qualitative and quantitative management of our waters;
- ? Preservation of our aquatic ecosystems (including marshes);
- ? Definition of required ecological quality levels for water;
- ? Preservation of the quality groundwater resources;
- ? Sustainable use of water as a resource;
- ? Satisfactory quality standards for surface water;
- ? Resuscitation of contaminated water;
- ? Reinforcement of protected areas, in particular catchment areas (In France we still have difficulty introducing this protection).

The Framework Directive also requires that a priority list of dangerous substances be drawn up: Member States will have to monitor these in detail. I will not mention endocrine disrupters as we have already discussed them.

The timetable set in the Framework Directive will be as follows:

- ? 2004: Descriptions of watersheds;
- ? 2006: Operational monitoring system;
- ? 2008: Public consultations;
- ? 2009: Publication of the management plan.



For more information I would refer you to the Aarhus Convention of which people in France are still too often unaware. It provides for the public's full and free access to public information and for free access to justice in environmental questions.

Finally, if you would like more information, I suggest you consult our site at: [www.eu.int/water/](http://www.eu.int/water/).

## IV. Questions

### **Janine PETIT, Vice-President of the Living Escaut Association (Association Escaut vivant)**

I have been active in trying to protect nature for over 30 years and am thus a member of a number of associations. I am delighted that the medical world is at last participating in such a Colloquium, regrettable a rare event.

I would like to make several remarks :

While it is true that typhoid and cholera are no longer rife in France, the number of cancers, allergies and neurological diseases is rising steadily. This is a matter for serious concern, in particular as these pathologies are linked both to what we eat and to the quality of water.

I was delighted with your remarks on food safety and on the establishment of the Public Health Intelligence Gathering Institute. However, protected areas around water collection points are forever being reduced, the use of pesticides is still authorised in fields, rings of sewage and medicinal substances are forever growing around industrial chicken and pig farms... In a word, we need to put an end to intensive farming and fight to reform the CAP again.

We also need to revise all our procedures for waste handling, transport and disposal. We regret that France does not have its own Water Police. Finally we are highly critical of a number of organisations that are far too lax in these matters, and of the Government in that it does not enforce existing laws. As a citizen I have the right not to be poisoned and to oppose subsidising farmers who are forever poisoning the public.

### **Christian MOREL**

I am sure your points will be dealt with in the workshops.

### **Josée CAMBOU, National Secretary of *France Nature Environment***

I strongly regret that we were not invited to be amongst the key speakers. Firstly we want a significant improvement in our knowledge about these matters, in particular about all the problems affecting animal health and on the synergy between the various contaminants. At the moment we are by and large ignorant on these matters.

In addition, the public is still waiting to be informed. While it is true that the quality of water has improved since the end of the 19th C, this is not necessarily true everywhere. A study carried out by the Haut-Garonne County DRASS found that between 1996 and 1998, 46% of the population had consumed water that was not in conformity with current drinking water standards. Brittany is not an isolated case.

We are familiar with the Aarhus Convention and are waiting for it to be transposed into French law. However, it does not just deal with the environment as it refers explicitly to health problems. We would in fact like to see a significant improvement in governance in water and health matters in France.

Finally, is anyone in a position to tell me what the cost is to society of all these waterborne illnesses and diseases?

**Christian MOREL**

With your permission, we will deal with that question in Workshop 2. It will give us an opportunity to hear other deeply felt statements.

**Professor Annick DELELIS**  
**Chairwoman of the Board of Directors of the Artois-Picardie Water Agency**

**Microbial and chemical risks**

As a preamble, I would like to join with Mr Baudot in thanking the Rhine-Meuse Water Agency for its excellent initiative. I also thank them for having chosen Metz, this symbolic and magical town, a salon of urban ecology and precursor in the field with the creation of the European Institute for Ecology, and as a major centre in the study of environmental sciences. Teaching there goes much further than in the pharmacy faculties, in particular in ecotoxicology and ethnopharmacy.

As professor at the Faculty of Pharmacy, I can assure you that we are in a position to assess health problems globally. In my discipline, botanical pharmaceuticals, I deal in particular with high street chemists. For my part I regret we not make better use of them as vectors for informing the public.

I also run a research group called "Biodiversity and Biomonitoring". For over thirty years the Lille tradition of botany in the field has led us to work on inventories of plant matter. We work closely with the Regional Office of the Ministry of the Environment. In addition my colleagues and I all belong to CSRPN (Regional Scientific Council for our Natural Heritage), which was asked to create the Natural Habitat 2000 Directory. In creating these inventories we noted a general deterioration in the state of the milieu, and using bio-indicators have studied the modalities of improving the milieu. In effect plants, inasmuch as they tolerate several xenobiotics, are capable of giving us information on the level of pollution.

Amongst the subjects preoccupying the European Commission is the development of bio-indicators to complete the information already available. In our research, we also discover biomarkers that enable us to assess the effect of these xenobiotics on human beings. We work on the whole ecosystem chain from producer to human being, who is in fact the final wastewater outfall containing all the contaminants.

As I was active in the region, and had a health and environment profile, the Ministry asked me in 1999 to become Chairman of the Artois-Picardie Water Agency. I accepted all the more willingly in that I personally know many of the people working in the Agency and the dossiers they are working on. From the moment I joined the Artois-Picardie Water Agency, I realised it was a superb tool with which to work in favour of the environment.

The persons working there are highly motivated, and have developed an outstanding technical expertise. I am thus convinced that the Water Agencies can deal with a number of the problems preoccupying the various public health agencies. We will be working together in close partnership which I am sure will be highly productive.

The Water Agencies are centres of knowledge available to the public, in particular via the Web, and centres of skills expertise and transversality. On several occasions this morning we have raised the necessity for transversality. By organising this Colloquium the Rhine-Meuse Water Agency has shown that it favours this approach. Perhaps the dynamism of these agencies will succeed in

countering the dead hand of our system of vertically structured disciplines, a verticality which prevents us from applying European directives in full. However, we are well aware that we will not be able to change such long-established mindsets overnight...

Whatever the case, the Agencies as interfaces can play a federating and coordinating role in the protection of water as a resource. This is in fact my answer to those of our critics who insist that we play a purely financial role. It is also our duty to act on natural milieux and preserve them. To achieve this we have a number of tools, in particular control of regional development. Unfortunately this is not enough and on this point I agree with the environmental associations; don't forget I was President of the Nord Nature Association in the early 1990s. It is important that associations criticise our inadequacies. We still lack a number of elements to be able to prevent water pollution accidents arising from regional development activities. I am thinking in particular of the Agricultural Orientation Laws that are particularly regressive when compared with the European Water Directives. Agri-environmental measures are in effect dealt with by county-level CTEs that at present do not include a number of important role-players including the Water Agencies. The latter feel that it is important that they participate in the County Agricultural Orientation Councils, all the more so as the watersheds are to be restructured to protect our water resources. As a priority, I would like to see Article 33 of the Water Directive extended to provided us with an effective regulatory tool that would, amongst other things, enable us to protect wetlands.

On this point I fully agree with the Water Agencies' European approach. The latest issue of the Department of Environment's publication recommends that the Natura 2000 Directive and the Water Directive be made even more transversal in the light of the need to protect certain milieux and wetlands, the starting point for the protection of water-quality. I would remind you that plants have a very efficient cleansing effect. Intelligent management of these should thus lead to lower costs.

Our Agencies are one Europe's main concerns as **we are key actors** in the European districts. With this in mind, we must improve our know-how and knowledge, and take new initiatives to ensure we meet the time schedule allowed for implementing the Framework Law.

In conclusion, I would not be doing my duty if I did not raise the problem of sustainable development. If developed countries have seen a reduction in waterborne diseases, on a world level, we must help less well-off countries eliminate the major epidemics that we suffered in the past and make a point of not bequeathing them the problems we now face.

**Professor Pedro MARSET CAMPOS**  
**Member of the European Parliament (Spain)**

**Water, health and politics: contradictions in Western economic models (Spain)**

I apologise for my very inadequate French, and trust you will forgive me for the additional effort you will have to make to understand me. Thank you for having invited me to this important Colloquium.

I appear before you today as a Member of the European Parliament. As you know, civilisation started with agriculture and brought vast epidemics in its wake. In some ways, water, health and politics have been closely intertwined since the very beginning. Water has in any case often been a source of discord between powerful countries. Even today, NATO defines water as a vital resource likely to give rise to conflicts between nations.

I would like to make the point that there is a contradiction between the model of sustainable development, and the economic model proposed in Europe. Logically politics should enable us to resolve this contradiction. However, I would like to share my experience with you. I come from the region of Murcia that was invaded by the Arabs in the 7th C, when they built a system of irrigation. We thus developed a very prosperous agriculture which, until today, has been our main source of revenue. Then in the 1950s, a canning factory was built and the waste discharged directly into the Segula River. At the time Franco was in power; there was no democracy and no public awareness of the dangers provoked by the pollution.

When Spain joined the European Union in 1986, agriculture and canning in Murcia were both intensive industries and pollution steadily increasing. We tried to alert public opinion but often met a wall of indifference, a legacy from the Franco years. The Aarhus Convention brought us three fundamental advances: access to information, the citizens' participation in decision-making, easier access to the law. As the first two principles were not applied in Murcia, we decided to take legal action. The analyses that were carried out at our expense showed that the Segula was one of the most polluted rivers in Europe. As an aside, note that we had to use an analytical laboratory from outside the region given the pressure exerted by the public authorities there. When we finally saw the judge we were informed that to continue the action would cost us the equivalent of FRF 300,000. Being a tiny political party we did not have that sort of money. However, there was a kind of justice in the end as two weeks ago the European Commission ordered Spain to pay a penalty of FRF 400,000 per day on account of the pollution in its rivers, in particular in Murcia. In the end we actually won! In our region however, we are still considered as going against the will of the people as we oppose certain economic and industrial interests.

The canning factory in Murcia reacted by saying quite openly that it will continue discharging its waste into the river for at least the next two years without this provoking any reaction.

I think that we should make a major effort to make the public better aware of these problems, in particular in Spain where Franco's dictatorship destroyed any kind of public awareness. We must defend the citizen's right to participate in decision-making.

**Professor Jean-Marie PELT**  
**Chairman, European Institute of Ecology**

**Endocrine disrupters or hormone mimics**

I should first like to congratulate the Rhine-Meuse Water Agency for having organised this conference in Metz. I should also like to add that when we first set up the European Institute of Ecology, referred to earlier, we had the full support of Mr Suzanne who was at the time director of the Rhine-Meuse Water Agency, a body which had started treating ecological issues long before the Ministry.

The subject of this conference, water and health, is all the more interesting because in the early days, ecology concerned only plant and animal life. Human beings totally excluded. It was very difficult for us to get our concern for human ecology accepted as part of global ecological programs.

Since I am a naturalist, I have been asked to talk to you today about polluting agents that disturb the endocrine system, commonly referred to "hormone mimics". In 1992 a book by Theo Colborn was published in the US (Chemically Induced Alterations in Sexual and Functional Development), subsequently published in France (1997) under the title, *L'homme en voie de disparition*. The preface to the book was written by Al Gore, who at that time was the Vice-President of the United States. The book provided interesting, but disturbing information. It told us about a professor from Syracuse University, a Mr Lindeman, who in 1950 published his results on research into DDT and the way it modified the apparent virility of young cocks. The crests and testicles of these animals remained underdeveloped. These findings were then forgotten.

In 1968, Ralph Schreider, from the Los Angeles Natural History Museum, once again drew attention to certain unexplained phenomena observed in nature. This experienced naturalist found that the seagull nests in his observation territory contained five to six eggs, which is very strange since "normal" seagulls lay no more than three eggs.

Ralph Schreider thought that two seagulls had laid eggs in the same nest. Watching the eggs more closely, he found that they were sterile. He was therefore quite right to question the efficacy of male seagulls! There were very few males in the colony and they appeared to be totally uninterested in the females. Continuing his research, Schreider found to his amazement that the two females who had laid their eggs in the same nest were living together! Our French friends would say they had a common-law pact! This was the first observation reporting this type of phenomena which were subsequently discovered to be caused by these "hormone mimics".

Theo Colborn's book refers to many similar cases. For example, around Lake Apopka in Florida, male alligators were found to have disappeared completely. Only a type of *transsexual* alligator remained with a very small penis and which showed no interest in its female counterpart.



Reproduction was no longer assured and for the first time a correlation was observed between the degradation of fauna in the lake and the nearby presence of a factory manufacturing DDT. A few years earlier, a serious accident had led to a large amount of DDT being discharged into the lake. The turtles in the same ecosystem were found to be hardly more virile: they lived in homosexual couples!

Gradually, it was established that this phenomenon was not exclusive to Lake Apopka, nor to aquatic life in general. Pumas in Florida showed similar signs: sterility, low sperm count, etc. Many cases of devirilised males were reported. The females, on the other hand, seemed to be taking over – if I may say so – nature apparently reflecting the changes observed in our modern society! Maybe these hormone mimics played a role in the sexual revolution of recent years, with Nature encouraging cultural changes ... but this may be going too far!

In 1992 two Danish researchers published works on the devirilisation of human males. The question asked was, "And men in all that?" If we are full of oestrogen molecules, what are the males of the human species becoming? It appears that the amount of sperm and spermatozoids in men are on the decrease. The article was highly contested at the time. However, two or three years later, a series of research papers were published confirming these claims. There appears to be a correlation between sperm deficiency and the year of birth; the more recent the date of birth, the higher the sperm deficiency.

The authors accuse several pesticides, PCBs in particular. PCBs are extremely persistent substances currently found all over the world. Several abnormalities have been observed: undescended testes, increase in prostate cancers (+ 27% in the US over the last 15 years), lower male sperm counts (from 113 million to 46 million spermatozoids per thousand litres over 50 years). The phenomenon is all the more dramatic since the amount of sperm ejaculated has also fallen by 25%. Unlucky boys and happy women's libbers may one day have to set up a movement to liberate men!

These oestrogen effects obviously make for entertaining presentations to conferences, but in fact we know virtually nothing on the subject. We need to carry out a great many in-depth studies and determine which hormone mimics are the most dangerous. They must also be banned, as happened last week in Stockholm, when the "Dirty Dozen" were outlawed, i.e. the twelve chemical products most dangerous for the environment.

None of the questions raised in this exposé have been publicised. In general, most people are unaware of our water-related problems. The general public is more aware of air pollution. On the other hand, two cases of typhoid filled the eight o'clock news every day for three weeks, a clear case of over-exposure in the media.

In spite of the improvements, the public still doubts that water is drinkable everywhere. In fact if we take the nitrate standard, this is not the case in a number of regions, with the resulting high consumption of mineral water. We must, however, insist that tap water be drinkable; letting the standard fall would be highly regrettable.

To achieve this we need the cooperation of both the public and the farmers. Consumers must insist on pure water downstream while the farmers need to reduce the amount of chemicals they use in their farming. Organic, and even planned agriculture both have a promising potential in this respect. agriculture.

In any case, we need to trace these hormone mimics with their apparently dramatic consequences. Product quality needs to be tested more thoroughly before approval for market release is given.

The document was drawn from recordings made at the Colloquium by *Hors Ligne*