Vít Klemeš

(President of IAHS in 1987-1991)

20 years later:

What has changed – and what hasn't

Association Lecture presented in the first plenary of the IAHS General Assembly in Perugia, 9 July 2007

An old rabbi was dying surrounded by members of his congregation. When he departed from this life, an all-knowing serene smile spread over his face, suggesting that some wonderful wisdom has been revealed to him in the afterlife; and those present begged him to come back at least for a moment and share the revelation with them. And, indeed, the rabbi rose on his death bed and said “Everything is different”, then lied down and died for good.

Since I have been recalled from my hydrological afterlife from as far as the Pacific coast of Canada, I will not be so lip-tight about my revelations and will describe some of them in more detail.

Hydrologic research & modelling

1 - Revelation No 1

$$\frac{\partial P(\mathbf{H}(\mathbf{x}_t,t),t)}{\partial t} = -\frac{\partial}{\partial H_j}\left\{ P(\mathbf{H}(\mathbf{x}_t,t),t)\left[\langle \eta_j(\mathbf{H}(\mathbf{x}_t,t),\mathbf{A}(\mathbf{x}_t,t),\mathbf{f}(\mathbf{x}_t,t))\rangle + \int_0^t ds\ \mathrm{Cov}_o\left[\frac{\partial \eta_j(\mathbf{H}(\mathbf{x},t),\mathbf{A}(\mathbf{x}_t,t),\mathbf{f}(\mathbf{x}_t,t))}{\partial H_i};\right.\right.\right.$$

$$\left.\left.\left.\eta_i(\mathbf{H}(\mathbf{x}_{t-s},t-s),\mathbf{A}(\mathbf{x}_{t-s},t-s),\mathbf{f}(\mathbf{x}_{t-s},t-s))\right]\right]\right\} + \frac{1}{2}\frac{\partial^2}{\partial H_j \partial H_i}\left\{ 2P(\mathbf{H}(\mathbf{x}_t,t),t)\right.$$

$$\left.\cdot \int_0^t ds\ \mathrm{Cov}_o[\eta_j(\mathbf{H}(\mathbf{x}_t,t),\mathbf{A}(\mathbf{x}_t,t),\mathbf{f}(\mathbf{x}_t,t));\eta_i(\mathbf{H}(\mathbf{x}_{t-s},t-s),\mathbf{A}(\mathbf{x}_{t-s},t-s),\mathbf{f}(\mathbf{x}_{t-s},t-s))]\right\}$$

This revelation is self-explanatory ... No?

2 - Physics behind statistics

It is the most important result of a paper sent to me by one of my young (i.e., everybody under 60) friends, who about 30 years ago were inspired by my attempts to find the physical basis of various statistical/stochastic patterns of hydrological phenomena[1,2,3], and who keep sending me their papers on the advances they have made along these lines, in the hope that I will appreciate them. This I certainly do and am grateful for them. But, sadly enough, I often don't understand them.

Nonlinear Hydrologic Processes:
Conservation Equations for Determining their Means and Probability Distributions

$$\frac{\partial P(\mathbf{H}(\mathbf{x}_t,t),t)}{\partial t} = -\frac{\partial}{\partial H_j}\left\{ P(\mathbf{H}(\mathbf{x}_t,t),t)\left[\langle \eta_j(\mathbf{H}(\mathbf{x}_t,t),\mathbf{A}(\mathbf{x}_t,t),\mathbf{f}(\mathbf{x}_t,t))\rangle + \int_0^t ds\ \mathrm{Cov}_o\left[\frac{\partial \eta_j(\mathbf{H}(\mathbf{x},t),\mathbf{A}(\mathbf{x}_t,t),\mathbf{f}(\mathbf{x}_t,t))}{\partial H_i};\right.\right.\right.$$

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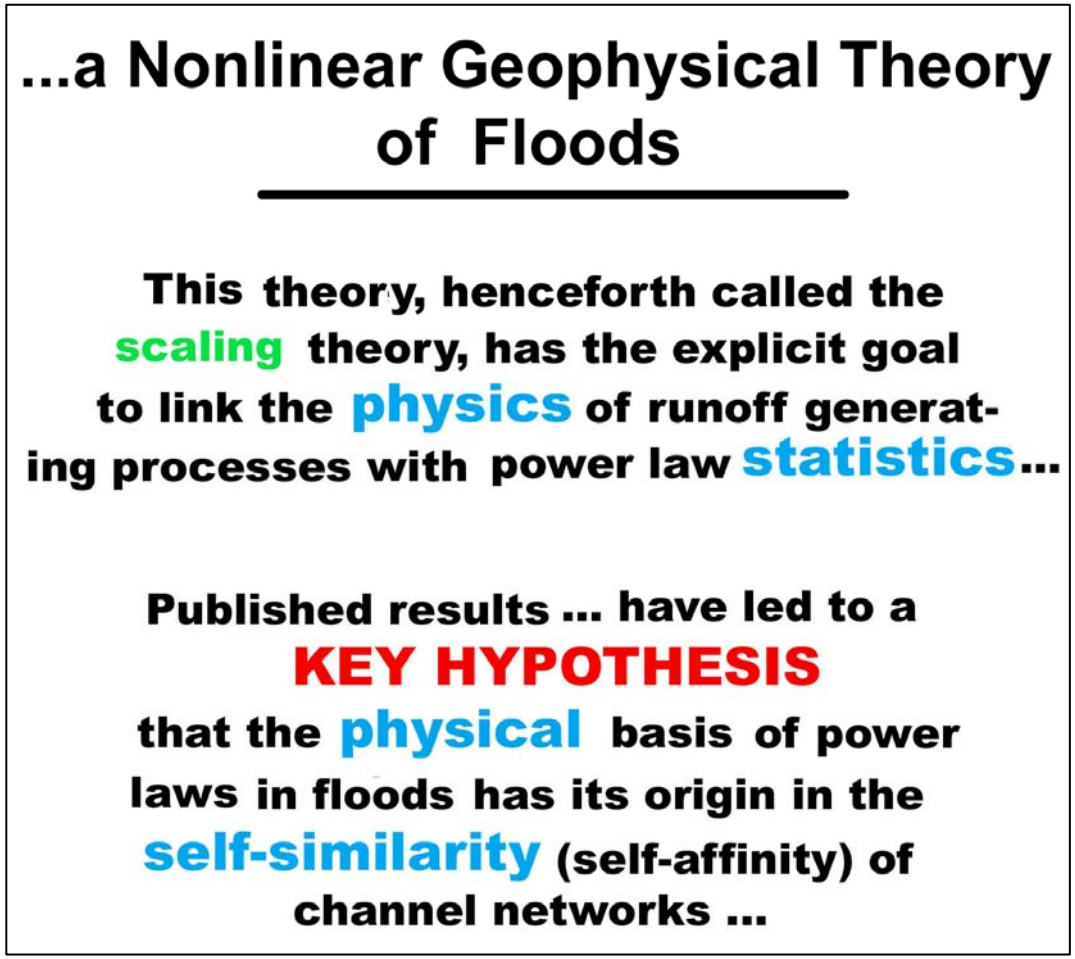
$$\left.\cdot \int_0^t ds\ \mathrm{Cov}_o[\eta_j(\mathbf{H}(\mathbf{x}_t,t),\mathbf{A}(\mathbf{x}_t,t),\mathbf{f}(\mathbf{x}_t,t));\eta_i(\mathbf{H}(\mathbf{x}_{t-s},t-s),\mathbf{A}(\mathbf{x}_{t-s},t-s),\mathbf{f}(\mathbf{x}_{t-s},t-s))]\right\}$$

It is not so bad when I do not understand the equations as in this case – I still can get an idea from the text what the author was after.

3 - Carts & horses

It is much worse when I don't understand even the narrative as happened in this case. My hope inspired by the first sentence dissipated after reading the second because I regard the 'key hypothesis' as putting the 'cart before the horse'. In my view, 'self-similarity of channel networks' and 'power law statistics in floods' are the consequence of their physical basis, i.e. of the physical laws and conditions governing the formative processes of floods and channel networks, not the other way around. It looks to me as if one claimed that the physical basis of the ellipsoid equation describing the shape of eggs is the fact that all eggs are self-similar.



My surprise was the greater when I saw that the author cited my paper “Of carts and horses in hydrologic modeling”[4] where I tried – in vain, it seems – to put across the point that the physical dynamics of a process is the horse and its statistical patterns are the cart. So, naturally enough, I asked my young friend for explanation, also pointing out that I didn’t understand what this principle has to do with ‘scaling’ since I understand scale as measure of ‘size’, ‘magnitude’, ‘intensity’ (scale of a map, of a disaster, Richter scale for earthquake magnitude) as explained in my paper “Conceptualization and scale in hydrology”[5] which he was referring to.

4 - Revelation No 2

The "Challenge of scale" in your sense [1983]... is foundational.
... That is why it is necessary to understand scaling in terms of physical processes.

That was the spirit in which your 1974 Hurst paper was written, ...

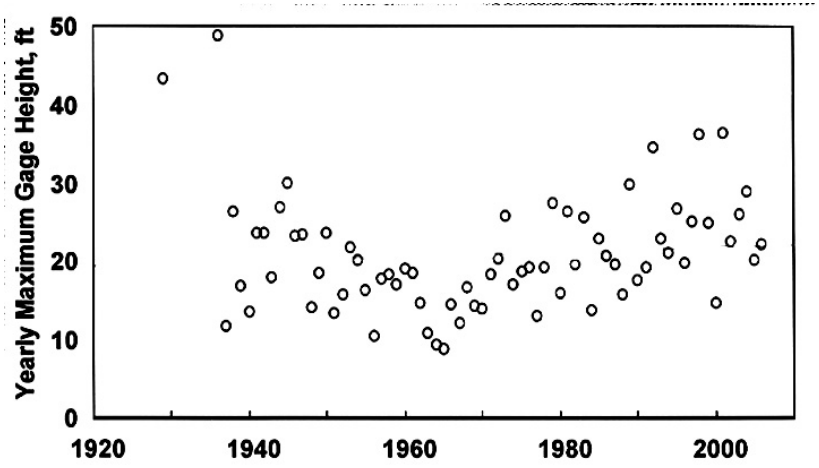
Without such understanding, scaling is of limited value in building a predictive science of hydrology.

His reply was even more baffling: While acknowledging my concept of scale as 'foundational', he revealed to me that my Hurst paper[2] was in fact written 'in the spirit' of scaling theory of physical processes, though I never mentioned scale or scaling in it (I have checked to be sure) and its whole point was to argue that fractals, self-similarity, Hurst phenomenon, etc., have their roots in physical mechanisms governing the process. What a revelation when it finally was explained to me what I wrote 33 years ago! And since I still don't possess the postulated understanding of scaling, the last paragraph disqualifies me from engaging in any kind of scientific hydrology (the emphases in this and the previous slide are mine).

Fortunately, I had foreseen this fate and stopped publishing in this field at the end of the past century to avoid the risk of embarrassing myself in print though, as you see, I don't mind doing it in an informal lecture.

So much for what has changed.

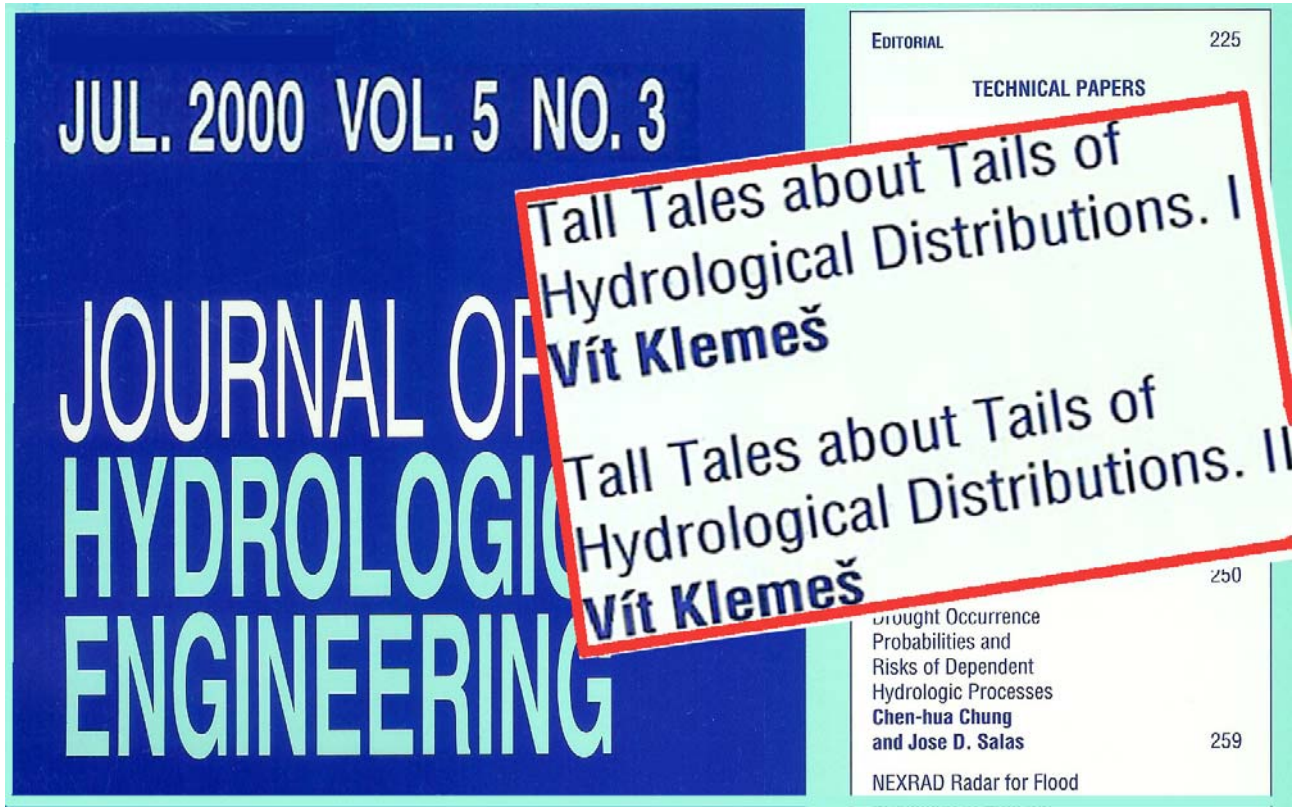
5 - Revelation No 3



What hasn't changed is that, for instance, sophisticated mathematical models are still constructed from 'data', without any knowledge about the hydrological processes that had produced them. This example shows the whole 'data base' (100 annual maxima of gage heights at Buffalo Bayou at Houston, Texas, and a barely readable map of downtown Houston) used (this time by an older friend of mine) for estimation of the effect of climate change on the probability of the highest flood levels. This he did, using the most up-to-date methods for filtering the data, fitting them with a 'theoretical distribution model' – a Gumbel distribution – and adjusting the fit for trends. When he asked me for comments on the tail of his final distribution fit reconstructed for 2015, I first wanted to know what he knew about the site, the river, the catchment – e.g., whether there had been any dredging in the channel, dyking, sedimentation, removal of levies, etc. He admitted that he has never seen the location and has only the data shown. So, in lieu of comments, I just sent him ...

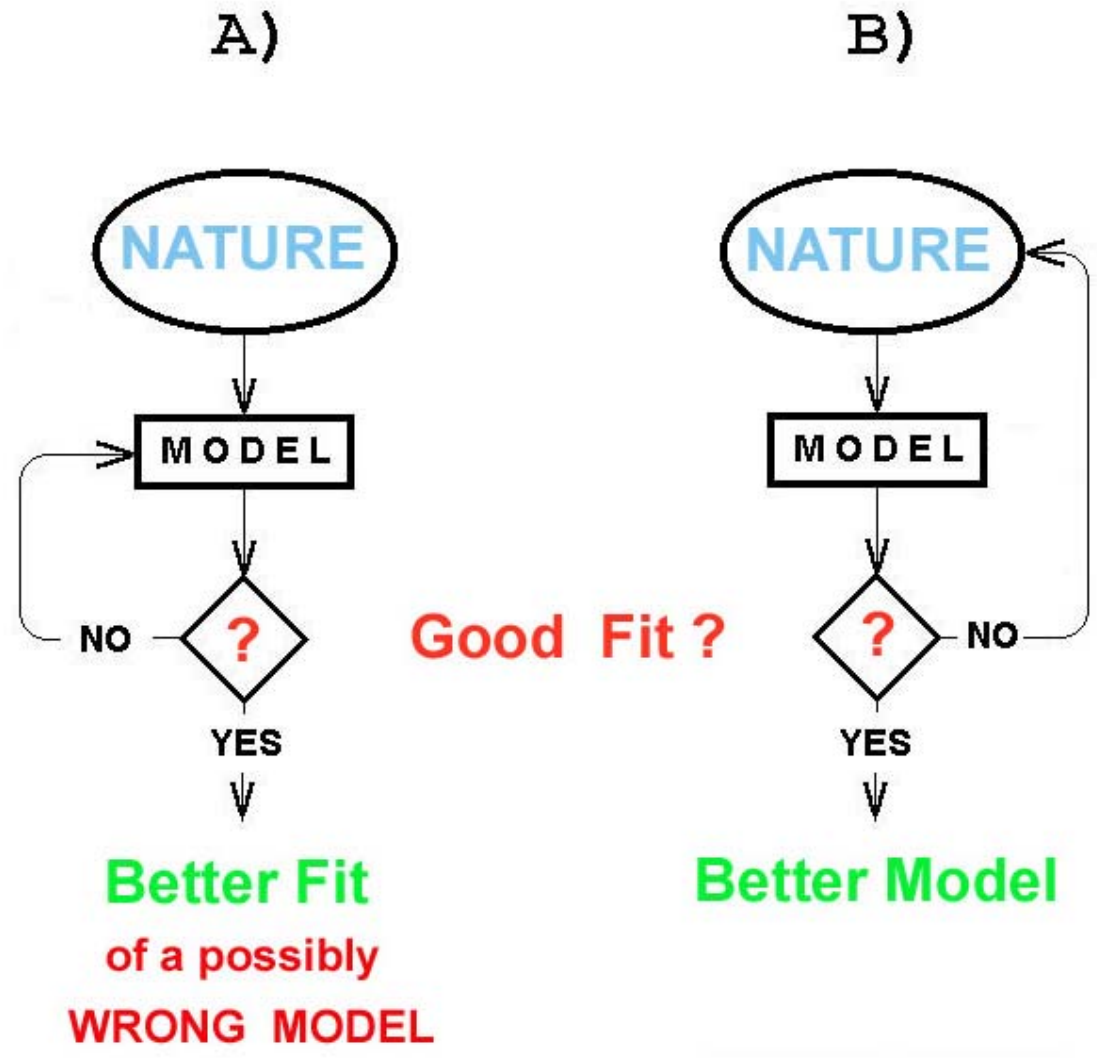
6 - Tall tales

...these two papers[6,7] of mine which, as their date indicates, are my swan song in 'scientific hydrology' eluded to earlier.



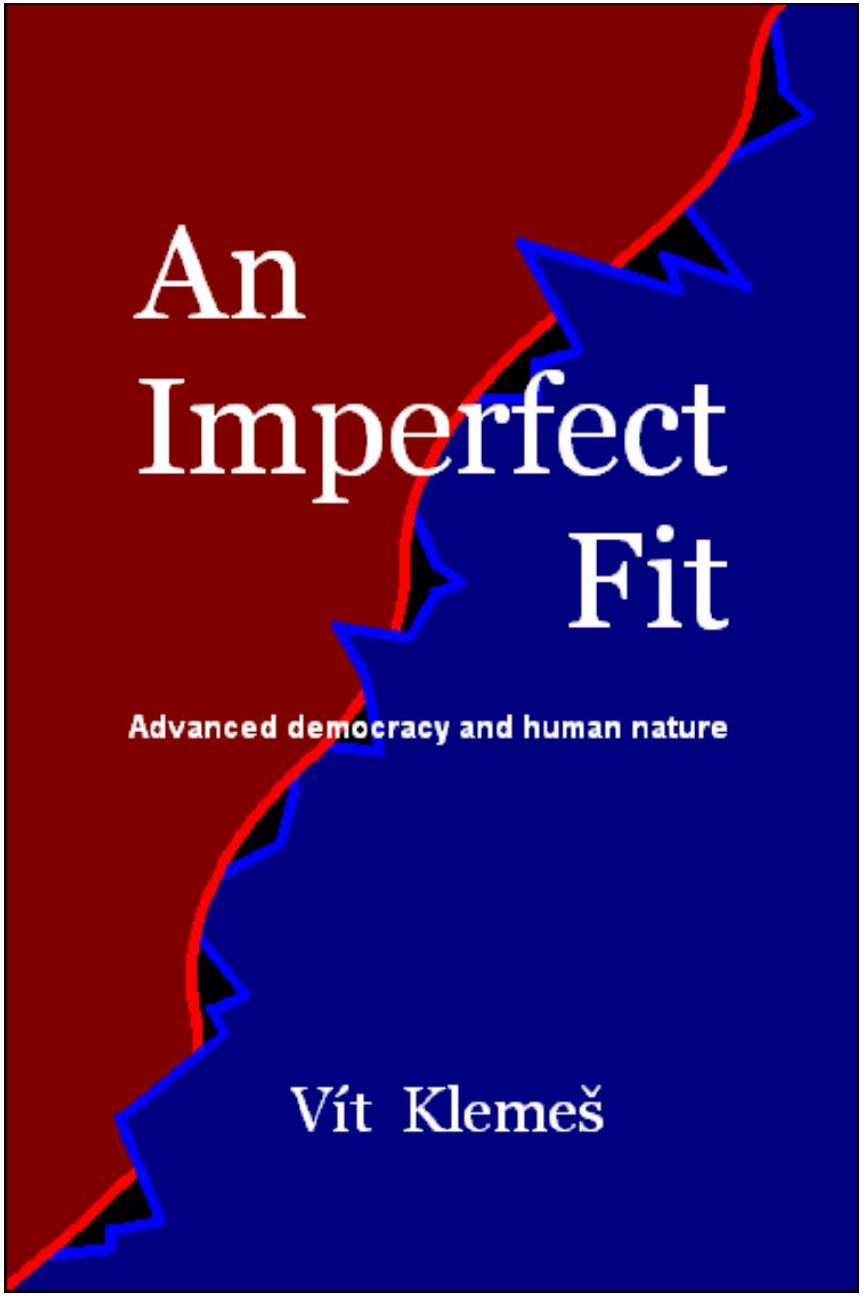
7 - Model fitting

Conclusion: There are, in principle, two ways of fitting models[4] and, unfortunately, scheme (A) is still generally followed in hydrologic practice, scheme (B) being much more demanding in terms of effort, time and money, and much less productive in producing 'scientific' hydrologic papers. But it should be recognized that every model, every fit of a model, however good it might be, is always imperfect and should be applied with caution. This is true not only for hydrologic models but for any model – economic, cosmologic, social, etc.



8 - Every fit imperfect

In this book[8] I attempted to illustrate this thesis for the 'democratic model' of the Western society which keeps being refined using scheme (A).



Attitudes to water and to engineering water works

9 - Old attitudes

To better contrast the old and new attitudes, I will dig deeper into the past than suggested in the title of this lecture and will take you to my native South Moravia where I can rely on my personal experiences: I was born, and during WW2 lived, in Podivín, after the war lived in Valtice, and graduated in civil (water resources) engineering at the Technical University of Brno; and this is where I am going to start:

10 - Best Dam- No Dam 1955

Here you see our graduating class of 1955 on a field trip to the Brno Dam (finished at the beginning of WW2), with our professor who had been one of its chief designers and supervisors of its construction. His favourite slogan was: “The best dam is no dam – that is – unless you need one; then you build it to the highest standards”. And the Brno Dam is a fitting example of this principle[9]: over 60% of its total cost was spent on the mitigation of its unavoidable environmental and social effects: compensation for the existing water rights, cost of the flooded land and its clearing from vegetation; dyking of the flat reservoir end to prevent formation of periodically exposed swamps; replacement of the flooded mud-brick village of Kníničky (after which the dam was originally named) with one built to modern standards (people from afar were coming to see and admire it, envying the good fortune of the relocated villagers).

The dam has become the darling of the citizens of Brno: Within two years after it was finished severe flooding occurred on the river and the dam greatly reduced damage to the city suburbs lying immediately downstream of it; its hydro-power plant (though "only a coffee-grinder" as our professor jokingly used to refer to it) became the main supplier of the city's electricity during the war when coal supplies were requisitioned for fueling the German war machine. And, after the war, it has become the center of Brno's water-based recreation (nowadays, 100 000 people are estimated to visit it during a hot summer day, not mentioning the cottages and summer homes built in its perimeter). By sheer coincidence, one of my first jobs after joining the Brno office of the Czechoslovak Water Authority in 1957 was to modify the dam's operating rules for optimizing its recreational use. And, if some 'green' politician wanted to 'decommission' it and restore the valley to its 'natural state' (as has been an increasing trend nowadays), I bet he would be lynched or burned at a stake in Brno's main square.

By the way, note the attire of the students (on a field trip at that!) – what a change you would see today: T-shirts, jeans, baseball caps, … so it is perhaps fitting, although sad, that of the 12 persons in the photo only four now survive.

11 -Wetlands around Podivin, 1930s

The wetlands around Podivín (shown here in my late father's painting) were usually flooded twice a year by the Dyje River; they were breeding grounds for billions of mosquitoes (once a warden was tied to a tree by poachers and was found dead of mosquito bites in the morning), for frequent explosions of the frog population (sections of the Podivín-Valtice road were sometimes impassable after sunset, 'paved' with frogs crossing it; their roar was deafening and even my great-grandfather, deaf as a stump that he was, used to complain about it).

The hay on the wetlands was ‘sour’ and domestic animals didn’t want to eat it – not even in war time when food was scarce and even people were often tempted to do so; hay stacks were routinely swept away and it was heartbreaking to watch hares, rabbits, moles, deer and even domestic animals struggling and many drowning in the current.

I suggest that the present overblown enthusiasm about wetlands, boarding on their fetishization, would be greatly reduced if its heralds had to live in them as did the inhabitants of Podivín and its neighbouring villages. Surely, wetlands are a natural part of the environment – but so are people and their habitats, and the two are often in direct conflict.

12 -Valtice -Lichtenstein Hqts till 1939

Valtice, my home town after WW2, had been the principle residence of the House of Lichtenstein until the outbreak of WW2 (their castle still dominates the town as this photo attests).

13-UNESCO-listed 'enhanced landscape'

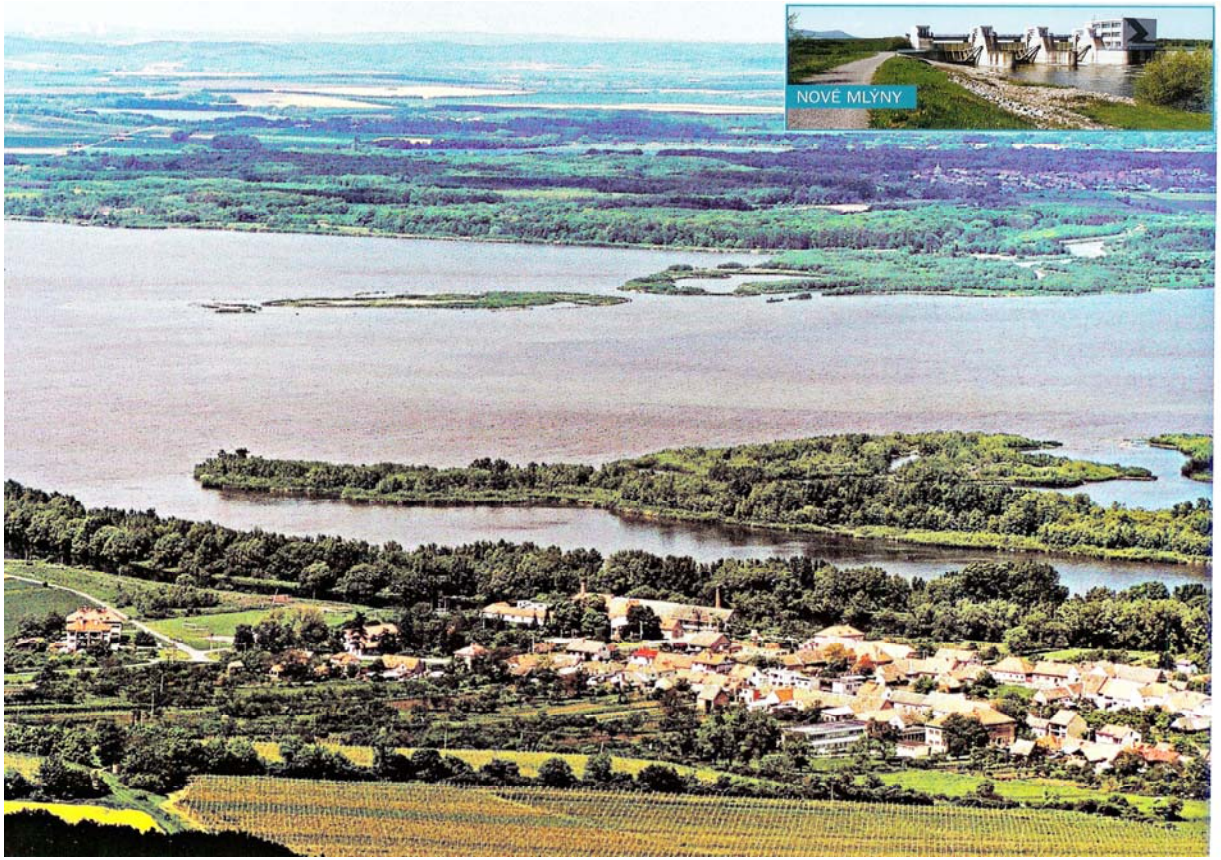
Their ambition was to make their vast estates (200 sq km in the south-east quarter of this map reproduced from a promotional brochure) as pleasant and livable as the local conditions would permit. They drained many swamps, made clearings in the rain forest, adorned them with works of architecture and sculpture, built dykes and, most importantly in the present context, permanently flooded wetlands along a local stream by a series of small dams which created a cascade of ponds (of several hundred of hectares each) and used them for fish farming (then a more profitable enterprise than the unproductive 'sour' wetland pastures) which continues to this day.

Needless to say that none of this would have been done had 'green politics' been in place in the first half of the 19th century when most of the work was done – environmental assessments and reassessments would be dragging on to this day! By the irony of history, about 50 years ago, an ornithological research station was set up in a former Lichtenstein hunting lodge on the banks of one of the largest of the pods by the same forces which would not have allowed its creation in the first place had they been in power at the time and would have denounced the whole project as 'rape of nature'. To cap this historic irony, the entire area of the former Lichtenstein estates has been on the UNESCO World Heritage List[10] since 1996 under the name "Lednice-Valtice Cultural Landscape" which *"succeeds in bringing together in harmony cultural monuments from successive periods and both indigenous and exotic natural elements to create an outstanding work of human creativity"* (the Lednice castle and some of the cultural monuments appear in the insets in this map).

To digress for a minute: Just about two weeks ago (June 27), another feat of water engineering, built in the same period (1826-1832), was added to the UNESCO World Heritage List as a *"work of human creative genius"*: the 202 km long Rideau Canal in Ontario, Canada, containing 47 locks and 52 dams, and flooding thousands of hectares of swamps and wetlands between Ottawa and Lake Ontario at Kingston, in which an estimated 500 workmen died during its construction of 'swamp fever' alone (also called 'bad air' disease which gave the name to 'malaria'). No doubt that this work of 'human creative genius' also would never materialize had the present 'green policy' had then been in force – the area in its virgin natural state could only make the UNESCO list as the north-American largest malaria-infested region.

Coming back to this map, a rather large water body can be seen in its upper part. It is the Nové Mlýny reservoir, a component of a regional water management plan conceived shortly after WW2 and aimed at alleviating adverse water conditions in the lower reaches of the Dyje river, suffering both from frequent flooding as well as from droughts (mean annual rainfall there is 560 mm, and 300mm to 400mm is not unusual). By another coincidence, in 1959 I was charged with the elaboration of the first-stage project ('investment proposal') for this reservoir. Informed by my experience with life in the Podivín wetlands, inspired by the Lichtenstein example, and remembering our professor's principles, I designed the reservoir as a cascade of three water bodies to reduce the effects of water level fluctuations, included levies along all their flat margins (with pumping stations to control runoff into the enclosed areas), proposed the construction of artificial islands for water fowl in the middle reservoir, protection by dykes of a historic little church in its inundation (shown in the upper left inset), and proposed the operational storage (for irrigation water supply and low-flow enhancement downstream) to be confined to the first (deepest) reservoir. Despite all of this, the project is still seen as a 'sore' on the environment by the greens who, nevertheless, admit that the middle reservoir has become a refuge and important transit point for migratory birds, and has attracted some bird species not previously observed in the area.

14-Nove Mlyny-middle reservoir

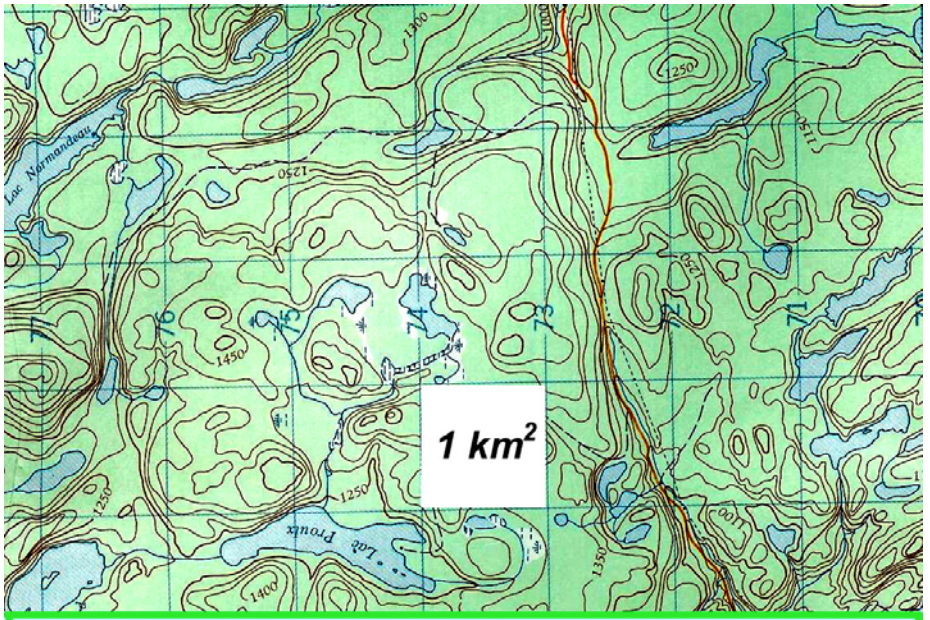


This is a view of this middle reservoir with some of its artificial islands (whose construction had to wait until the fall of the Communist regime in the country) and with vineyards on its adjacent slopes seen in the foreground (the 'offensive' dam is shown in the inset). But in contrast to the ongoing vilification of the project be the greens, the locals like the reservoirs (the uppermost one is used for water-based recreation) and the wine growers even claim – rightly or wrongly – that the micro-climate has changed in their favour, with less damage due to early-spring frosts, and better wine quality; that their wines are winning more prizes at exhibitions, and had even been selected for the cellars of the former Czech President Havel.

15 -Wine tasting in Valtice, 2005

As I occasionally have an opportunity to taste the local wines, I can testify that President Havel had made a good choice in this case (I in particular can recommend the region's whites: Traminer, Veltliner, Neuburger, Müller-Thurgau, Riesling).

16 - Green & blue landscape of Canada



The number of lakes larger than 3 km² is estimated to be close to 31,200... There is no official estimate of smaller lakes

For fresh examples of contemporary attitudes towards water works and even to water as such, I shall take you to Canada. When approached from the north-east (normal flight routes from Europe) it is at first difficult to tell whether one still is over the ocean dotted with islands, or over the land dotted with lakes. Only closer to Toronto or Montreal the landscape becomes clearly defined and looks as shown: green and blue, a land of countess lakes and forests. But none of the lakes seen on this map (about 30) makes it to the official list and most don't even have a name: typically, they are beaver lakes; there are hundreds of thousands of them across Canada – beavers have been the most productive and accomplished Canadian dam builders for thousands of years. The lakes the dams create are beloved by all Canadians, from the most aggressive environmentalists down to ordinary folks like myself. And for a good reason, as you can see in the following photo.

17 - Klemes beaver lake (1970s)

This beaver lake in Quebec was once called ‘Klemeš Lake’ (they are often called by the name of their current owners) and was enjoyed by our family for over 15 years.

18 - Triangle Mtn man-made lake (2007)

Here is a similar, though smaller, lake, a 10-minute walk from our present home on the 'Triangle Mountain' in Victoria – a gem of the neighbourhood, pleasant to dip in on a warm summer day or just sit on a rock, watch the blue herons, ducks, and other water fowl on the lake and eagles overhead, and ponder the imponderable.

But this lake has one fatal flaw: its dam was not built by beavers but by men, as a fire reservoir, about 80 years ago.

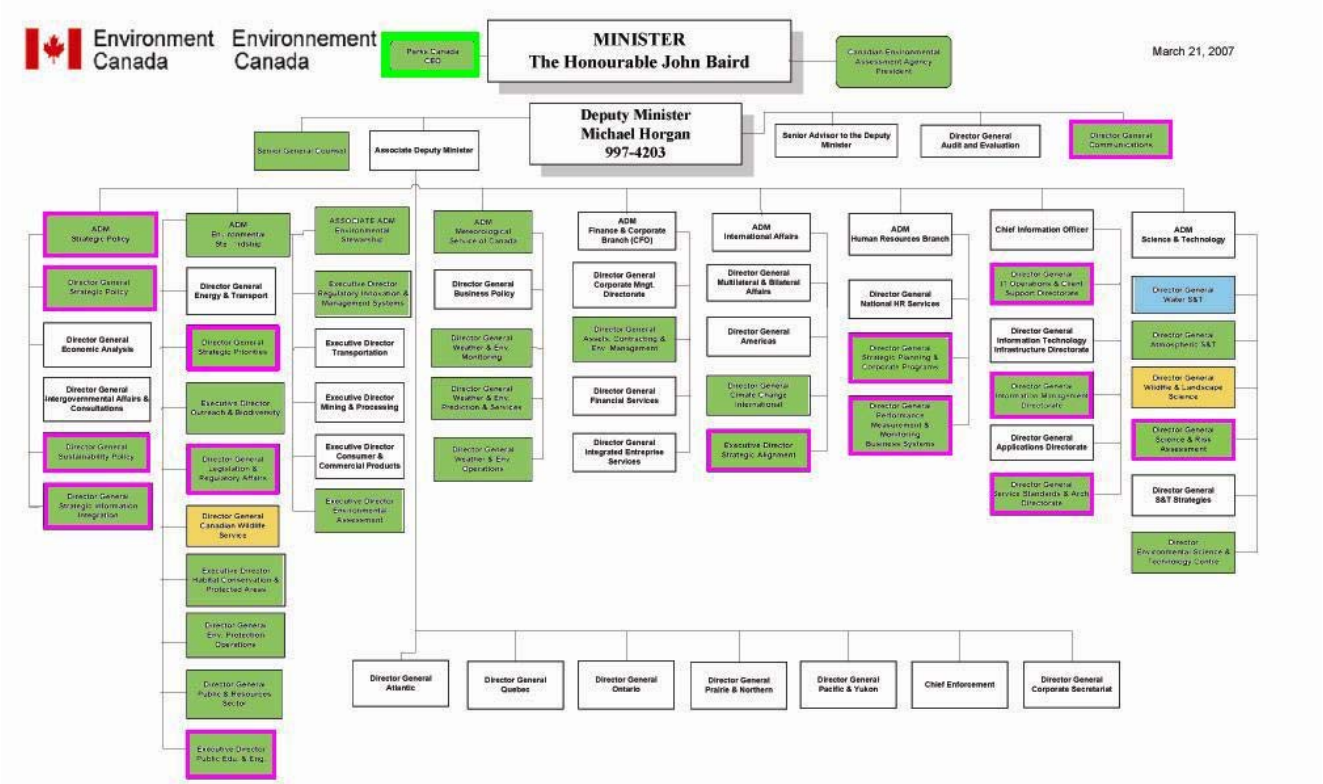
19 - Triangle Mtn 'offensive' dam

And here you see its dam, ‘offensive’ to the local greens. So offensive that the Provincial Environment ministry yielded to the presure to have it removed and the creek ‘restored to its natural state’ and dispatched two engineers to our town-hall meeting to show us a film documenting a collapse of an earth dam, so as to scare us into agreeing with the dam’s removal.

When the show was over, there was silence – how can laymen argue against such evidence, presented by experts from the Ministry? I was infuriated, got up and denounced the experts of blatant demagoguery, pointing out that our dam had none of the features leading the collapse of the dam shown: it doesn't have a bottom outlet pipe, smooth concrete abutments, spillway constructed over the earth-fill, elements along all of which water can seep and wash out the earth fill as was the case with the collapsed dam in the film. Our dam's spillway (partly visible in the background) is built on solid rock in a natural depression away from the body of the dam and discharging into a different creek; the maximum depth of the lake is about 4 meters while the dam crest is 10 meters wide, and the dam shows no signs of excessive seepage even after its 80 years of age. When I finished, all hell broke out, everybody jumping up with all kinds of accusations of government's dirty tricks, real and imagined, and the experts had barely enough time to collect their gadgets and leave. For the time being, our dam and lake appear to be safe.

This is an example of how the 'green' politics works at the local level. But because all levels of government are 'self-similar' as the eggs mentioned earlier, it is the same story at the Provincial (i.e. regional) and the Federal (national) levels – another important revelation that I was privileged to receive in my hydrological afterlife was that NOTHING CAN BE GREEN WITHOUT WATER – EXCEPT 'GREEN' POLITICS.

20 - Environment Canada GREEN landscape



This is illustrated by this example showing the present green 'landscape' of Canadian Federal Department of Environment – what a difference from the green/blue landscape on the map shown a few minutes ago! When I retired 18 years ago, at least six boxes had 'water' or 'hydrology' in their names: today only one remains while about 30 boast 'environment', 'ecosystems', 'climate change', 'green-house gasses', either directly or hidden behind the purple-framed 'strategies', 'coordination', 'integration', 'planning', 'priorities', and similar buzz-words now infecting all bureaucracies. As a matter of fact, only one unit in the whole chart – the green-framed Parks Canada – deals with the green part of the environment.

But all compete in ‘greening up’ their names and image - even the three branches of the Meteorological Service – Weather monitoring, Weather prediction, and Weather operations – have changed their names to the greener sounding Weather & environmental monitoring, … etc. How clever! How ‘politically correct’!

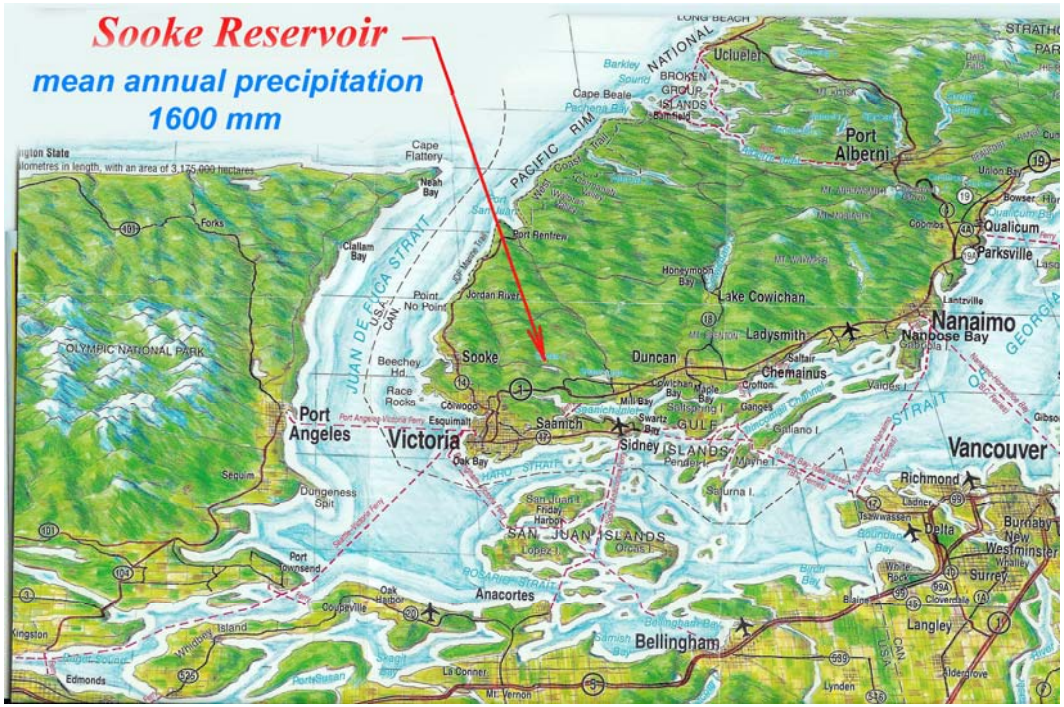
One gets the impression that ‘water’ has now joined ‘dam’ on the list of dirty (‘four-letter’ – on average at least) words to be avoided in decent company.

This leads me to one more important revelation that I can share with you: a new infectious disease has sprung up – a WATER-BORN SCHIZOPHRENIA: on the one hand, we are daily inundated by the media with reports about water-caused disasters, from destructive droughts to even more destructive floods, and with complaints that “not enough is done” to mitigate them; and, on the other hand, attempts to do so by any engineering means – and so far no other similarly effective means are usually available – are invariably denounced as ‘rape of nature’(often by people with only the foggiest ideas about their functioning), and are opposed, prevented, or at least delayed by never ending ‘environmental assessments and reassessments’.

21 - Summer in Klemes backyard

And this is why, for instance, lawns and gardens in Victoria often look like the Nevada desert in summer and the wandering deer are grateful for every green twig one can clip for them from a cherry or apple tree. This brings me to complementing my two examples of how the self-similar green bureaucracies operate at the local and Federal levels with one illustrating their operation at the Provincial level, thereby proving that their self-similarity is scale—invariant:

22 - Victoria water supply



Sooke Reservoir is the primary reservoir in the 'Greater Victoria Water Supply Area'. Its first dam, built in 1914, was 3.7 metres high, was raised to 13.2 metres in 1970, and designed in such a way that it could be raised in the future. By the mid 1980s it was no longer sufficient for the Victoria population swelled to about quarter million people but, instead of implementing the long planned dam heightening, water restrictions were introduced and the situation grew more critical every year while the reservoir expansion was being delayed by endless environmental assessments, deferrals, new 'strategic plans' and other delaying tactics until about eight years ago when an extremely severe drought struck, the frustration of Victorians boiled over and threatened to lynch every 'environmentalist' in sight; only then the green activists, with tails between their legs, crawled under their desks and the dam was raised by 6 meters, increasing the reservoir holding capacity by 78 percent.

23 - Sooke dam raised by 6m

It was the endless 'environmental assessments' of the flooding of this narrow brownish strip of land for which Victoria had to suffer permanent water restrictions for years – a strip requiring nothing more than the clearing of a few hundred acres of bush, with no need for relocation of any settlements or industrial plants, for construction of new roads (the one visible in the photo had already been in place for years), for protection of historic sites or anything else – and this in the Province of British Columbia where every year thousand times larger areas are flooded by beaver dams and stripped clean by the lumber industry, without a word about any environmental assessment.

And the south Vancouver Island, with its close to 2000 mm of annual precipitation, is no Nevada desert, not even any rain-starved South Moravia with a mere 560 mm, but is among the regions most generously blessed with water in all of Canada. So, why all the restrictions, delays and assessments? Because an enlargement of a concrete dam – nowadays an intrinsically offensive structure - was required to satisfy the rising water demand.

But, with the 78% enlargement of the reservoir completed, water restrictions were finally over – or so everybody thought. But guess what happened:

24 - Water Restrictions remain

Unbelievable as it sounds, water restrictions have remained in place. Why? Because as soon as the enlarged reservoir filled up during the rainy season, its water level was immediately lowered by exactly the same extent by which the dam had been raised! Ostensibly, “to do research” on a swamp at the reservoir end – a swamp which has always been there but whose “research” suddenly became urgent only when it was to be flooded – and we were admonished about the “need to understand that water is a finite resource” while millions of cubic metres of it were let to spill into the ocean rather than saved in the reservoir for use when needed.

Expect restrictions despite surplus

An upgrade to Sooke Lake reservoir completed in November increased the dam's capacity to about 93 million cubic metres, up from the previous capacity of 60 million cubic metres.

neans odd-num- allowed to water rom 7 to 10 p.m. lays, while those n Thursdays and even-numbered

As a spring heat wave toasted the region on Easter weekend, the dam was at 93 per cent capacity, or about 86 million cubic metres.

Jensen said conservation measures could prolong the life of the dam by a decade or two.

"Never in our history have we stored this much water. We're in excellent shape for this coming summer," said Nils Jensen, chair of the CRD water board.

An upgrade to Sooke Lake reservoir completed in November increased the dam's capacity to about 93 million cubic metres, up from the previous capacity of 60 million cubic metres.

However Jensen said conservation measures used in summers past will still

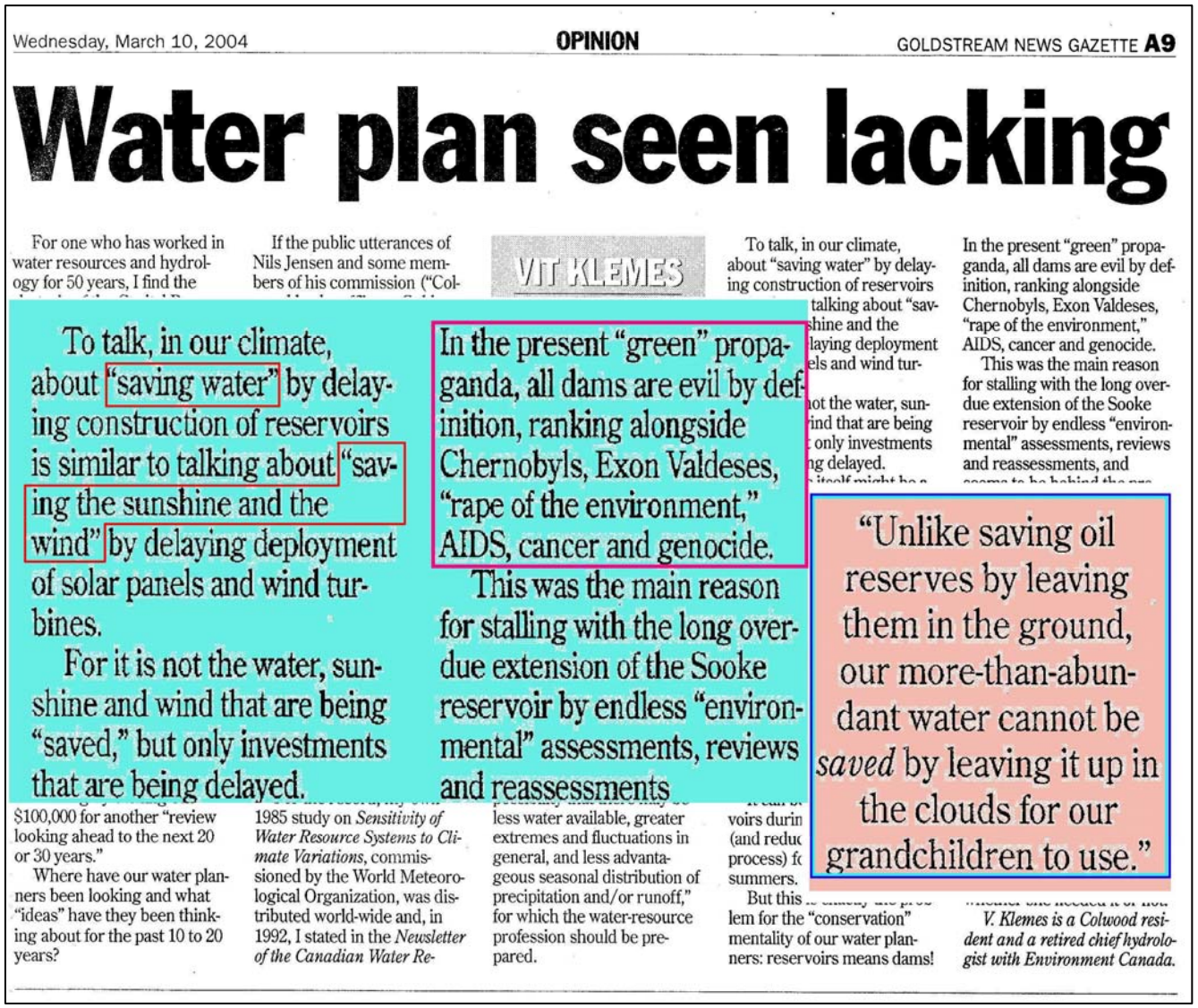
As the reservoir filled up this winter, officials decided to keep the water level six metres below full capacity

"We wanted to do more research on an area of swamp at the end of the reservoir, so we didn't want to flood that."

We need to understand that water is a finite resource.

25 - Critique of GREEN propaganda

Yes, as you could have guessed, I got angry again, but to no avail. I was attacked as being "out of touch", not understanding the modern environmental management concepts, etc., etc. – another revelation from my hydrological afterlife.



Wednesday, March 10, 2004 OPINION GOLDSTREAM NEWS GAZETTE A9

Water plan seen lacking

VIT KLEMES

To talk, in our climate, about "saving water" by delaying construction of reservoirs is similar to talking about "saving the sunshine and the wind" by delaying deployment of solar panels and wind turbines.

For it is not the water, sunshine and wind that are being "saved," but only investments that are being delayed.

In the present "green" propaganda, all dams are evil by definition, ranking alongside Chernobyls, Exon Valdeses, "rape of the environment," AIDS, cancer and genocide.

This was the main reason for stalling with the long overdue extension of the Sooke reservoir by endless "environmental" assessments, reviews and reassessments

"Unlike saving oil reserves by leaving them in the ground, our more-than-abundant water cannot be *saved* by leaving it up in the clouds for our grandchildren to use."

For one who has worked in water resources and hydrology for 50 years, I find the

If the public utterances of Nils Jensen and some members of his commission ("Col-

To talk, in our climate, about "saving water" by delaying construction of reservoirs talking about "sav- shine and the laying deployment els and wind tur-

In the present "green" propaganda, all dams are evil by definition, ranking alongside Chernobyls, Exon Valdeses, "rape of the environment," AIDS, cancer and genocide.

This was the main reason for stalling with the long overdue extension of the Sooke reservoir by endless "environmental" assessments, reviews and reassessments, and

ot the water, sun- ind that are being only investments g delayed.

$100,000 for another "review looking ahead to the next 20 or 30 years."

Where have our water planners been looking and what "ideas" have they been thinking about for the past 10 to 20 years?

1985 study on *Sensitivity of Water Resource Systems to Climate Variations*, commissioned by the World Meteorological Organization, was distributed world-wide and, in 1992, I stated in the *Newsletter of the Canadian Water Re-*

less water available, greater extremes and fluctuations in general, and less advantageous seasonal distribution of precipitation and/or runoff," for which the water-resource profession should be prepared.

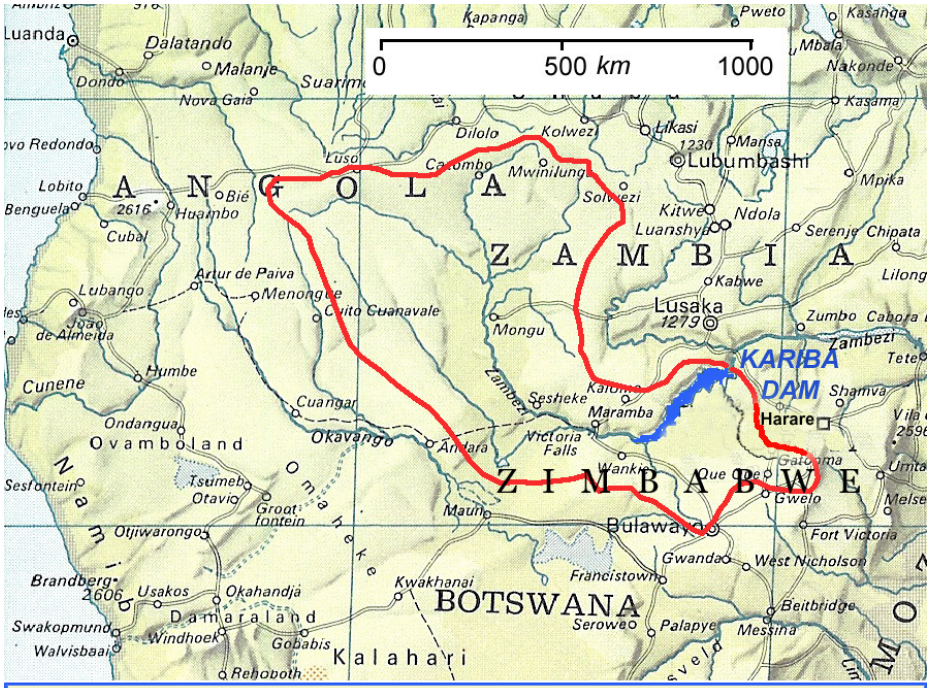
voirs durin (and reduc process) fo summers.

But this lem for the "conservation" mentality of our water planners: reservoirs means dams!

V. Klemes is a Colwood resident and a retired chief hydrologist with Environment Canada.

26 - Kariba dam-virtues of hydropower

I will end with perhaps the most telling example of these concepts. Every day we are bombarded by the media with the need to reduce the use of fossil fuels and develop 'renewable energy resources' – and rightly so. But, while being constantly lectured about the virtues of solar and wind energy which top the list, never a positive word is said about the most effective renewable energy resource of all: the hydro-electric power, whose two main virtues which no other renewable resource can match, or even come close to, are carefully kept out of sight. Why? because hydro-power requires the construction of the vilified dams and any positive aspect of it would undermine the green propaganda, the more so, the more important it is. I am all for wind turbines, solar panels and the rest, but want here to illustrate the two superior virtues of hydro-power by comparing its effectiveness with that of solar and wind energy.



For this I have chosen the Kariba dam in Africa, in order to avoid a charge that my revelations have been just the product of my Canadian and Czech biases.

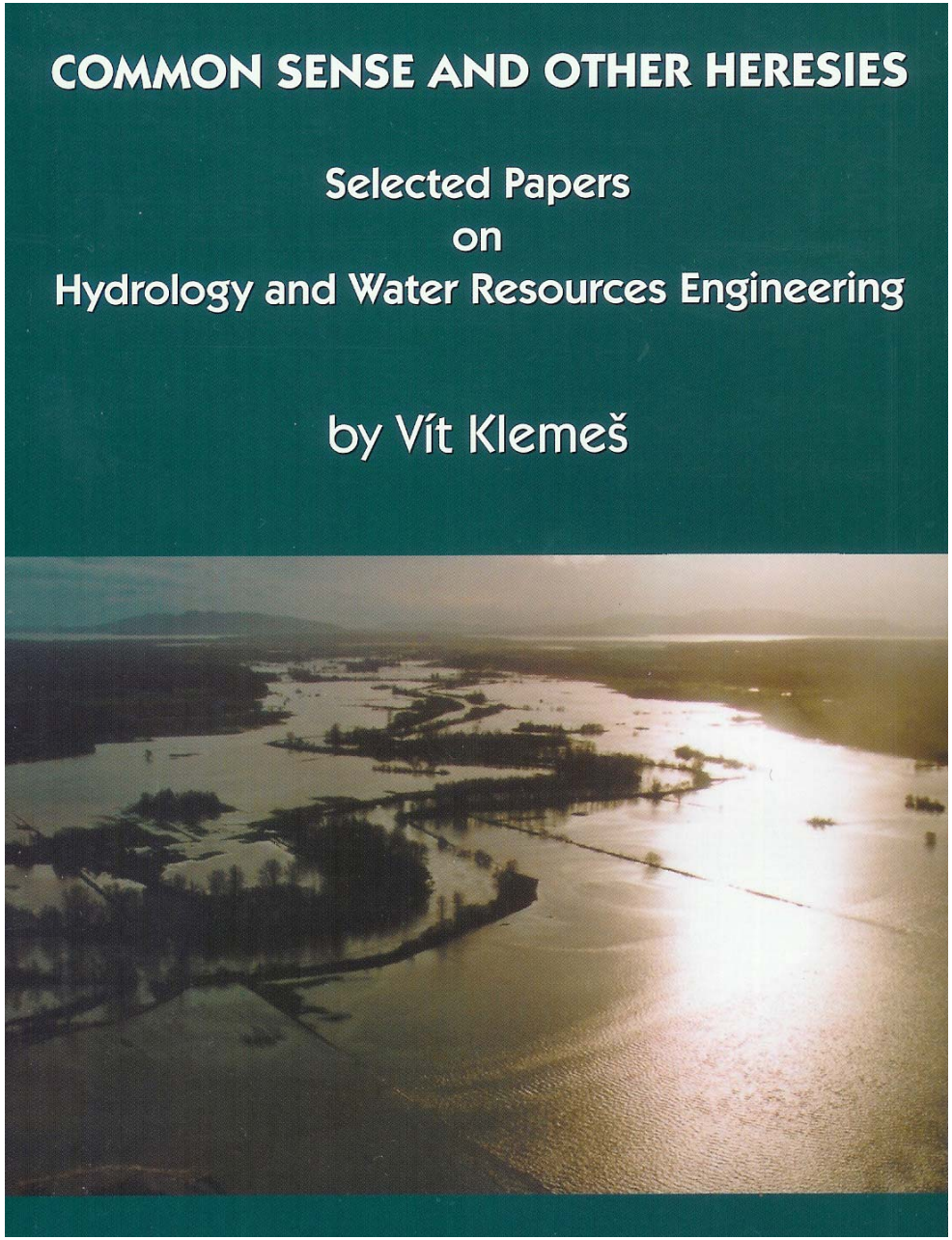
The Wikipedia entry gives a laconic summary of the Kariba facts some of which are reproduced in the picture. But the bulk of it deals with all its negative effects, from the mass of its concrete whose weight supposedly may trigger earthquakes, to the suffering of the relocated population and wildlife, to the destruction of the environment. It doesn't mention that the 'destruction' of 5 400 square kilometers by flooding (destruction? suffering of relocated population? – remember the Brno dam!), has made it possible for *the energy of the surface runoff from the dam's* *whole catchment* – an area more than 100 times larger – to be harvested at *a single point*! – this is the first of the two unmatched virtues mentioned. Just imagine – if you can - what size of a lens would be required to concentrate all the catchment's solar energy into a single point, or what size of a funnel to do the same for all the wind! More realistically, if solar energy from the whole catchment were to be captured, its whole area would have to be covered with solar panels, roads and maintenance centers thereby destroying all the 663 000 square kilometers of its environment; and the same would be true if all the catchment's wind power were to be exploited. But the second virtue is perhaps even more important: it is the fact that the *water can be stored* in the reservoir *and its energy made available any time*, day or night, wind or calm, rain or no rain, *on a ten-minute notice*, and turned off the moment it is not needed.

Neither of these two things are possible with solar or wind energy. No wonder then that they are so carefully hidden from the public whose indoctrination with hate towards 'evil dams' often seems to have a higher priority than the renewable energy itself.

I shall close with a plea to all of you, hydrologists and other water professionals, to stand up for water, hydrology and water resource engineering, to restore their good name, unmask the demagoguery hiding behind the various ‘green’ slogans. As in any sphere of human activity, errors with adverse effects were and will be made in our profession as well (think of the human toll of errors made in the medical profession – and nobody is vilifying hospitals and advocating tearing down medical clinics). But, on the whole, our profession has nothing to be ashamed of – from the times of the ancient Mesopotamia, Greece and Rome to the present, it has done more good for mankind than all its critics combined. This is not a revelation: this is a historical fact. So, be brave, be proud, …

27 - Be Heretics, use Common Sense

. ... be heretics if necessary, and above all, use your common sense[11]!



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