

PROCEEDINGS

*Corporate Responsibility to Facilitate
Sustainability in the Water Sector*

2002 Founders Seminar

Stockholm, August 14, 2002



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WELCOME

by Stig Larsson

Ladies and Gentlemen, Dear Friends,

In 1991, the newly formed Stockholm Water Foundation established the Stockholm Water Prize.

With both pride and pleasure we can state today that our prize has developed into a well-known and highly respected distinction in the water world.

Eighteen companies and organizations, collectively known as the Founders, stand together with the City of Stockholm behind the Stockholm Water Prize.



The Founders Seminar, which is arranged by and for the Founders and their guests in honour of the Water Prize Laureate, has in recent years become an appreciated forum for discussion and exchange of experiences between water and industry professionals. As such it has contributed further to the Stockholm Water Foundation's goal to encourage research and development in regard to the world's water environment.

As Chairman of the Stockholm Water Foundation I hereby welcome you to the 2002 Founders Seminar, and I leave the floor to Mr Björn Stigson, chairman of today's seminar.

Thank you.

PERSISTENCE OF DRY AND WET PERIODS: THE IMPACT OF EARTH SURFACE CONDITIONS AND THEIR IMPORTANCE FOR SUSTAINABLE DEVELOPMENT

by Ignacio Rodríguez-Iturbe

Abstract

Dry and wet periods are intimately linked to specific components of the hydrologic cycle and thus their occurrence as well as their intensity in time and space can be greatly influenced by climatic changes. The primary forcing factors are changes in precipitation and evapotranspiration. They cause alterations not only in the mean conditions of water availability, but very importantly also in the variability and seasonality of supply (and demand) of the resource. In addition to these direct effects, climatically induced changes in vegetation may have a considerable impact on the hydrologic cycle. As a feedback effect, the storage of heat and moisture in the soil is a key factor in determining the spatial and temporal character of climate. The strong coupling between the forcing factors and the soil moisture conditions over large spatial scales may undergo shifts and alterations of pronounced character as a result of climatic changes.



Introduction

Time-series of climatic and hydrologic variables exhibit complex structures that often preclude their modeling with simple statistical tools. An important problem lies in discovering the mechanisms through which ordinary perturbations in the land-atmosphere system are remanifested as complex structures in the statistics of observed data. Our goal in this presentation is to identify and analyze the interactions and feedbacks between the land and the atmosphere that result in some of the observed complexities in hydrologic and climatic records.

The persistence of wet and dry periods is a complex phenomenon which may carry devastating consequences for human kind. Thus the water deficit involved in a drought usually occurs over large spatial scales ($>10^5$ km²) and over time scales of months and years. A well known and dramatic example of a major drought is the one in the sub-Saharan regions. Figure 1 shows the standardized time series of annual rainfall where it is observed that in the early part and in the end of the record the drought persists for near two decades.

In drought analysis, it is not only the total amount of the water deficit integrated over periods of, say, one year that is of major importance. The timing of such deficit inside the annual period is also crucial. Thus the total amount of the resource may not show a major deficit but if all or most of the deficit is concentrated in a period where the moisture is most needed, then one usually talks about the existence of a drought. A relatively minor shift in the temporal march of the precipitation or the snowmelt season may have very large and adverse consequences if it persists for several years.

Climatic and hydrologic records are characterized by indeterminateness. This behavior refers to the situation when the climate exhibits persistence in several distinct states with occasional transitions between the states. Prolonged periods of drought with abrupt transition to long periods of moisture abundance without any clear statistical equilibrium in climate is an example. It will be shown that indeterminateness in climatic and hydrologic records may result from simple stochastic noise, such as in rainfall, that has been routed through the web of interactions and feedbacks inherent in the water balance equation.

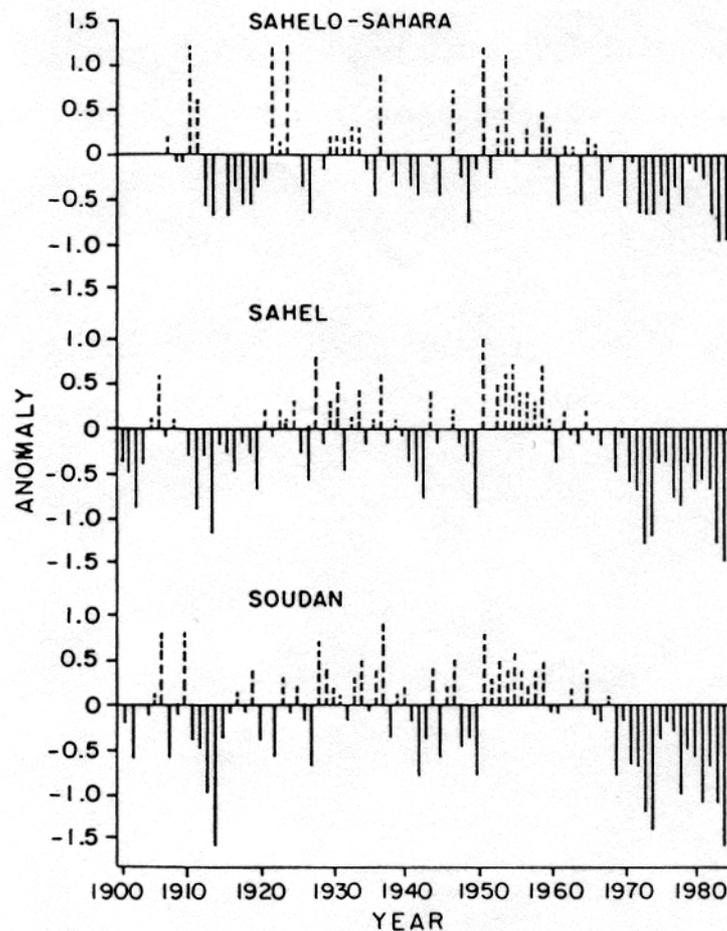


Figure 1. Standardized time-series of annual rainfall in sub-Saharan Africa (from Nicholson and Entekhabi, 1986).

Land-Atmosphere Feedbacks in Hydrologic Persistence

The water balance equation for the active soil depth at the surface is composed of precipitation inputs, runoff losses and evapotranspiration outputs. These fluxes are functions of the soil moisture state variable which serves as our diagnostic. The local recycling of moisture over continents is thus a critical factor in determining the response of continental climates to variations in the large-scale water budget.

Figure 2 shows a summary of the internal (or local) and external (or large-scale) conditions that can contribute climatic feedback. This figure uses a negative precipitation anomaly as an example; similar diagrams could be constructed for every process linking the land and the atmosphere through exchanges of mass and energy. In each case, local (internal) versus large-scale (external) factors may be distinguished. As the arrows connecting the two columns indicate, the local and external conditions affect one another (Brubaker, 1995).

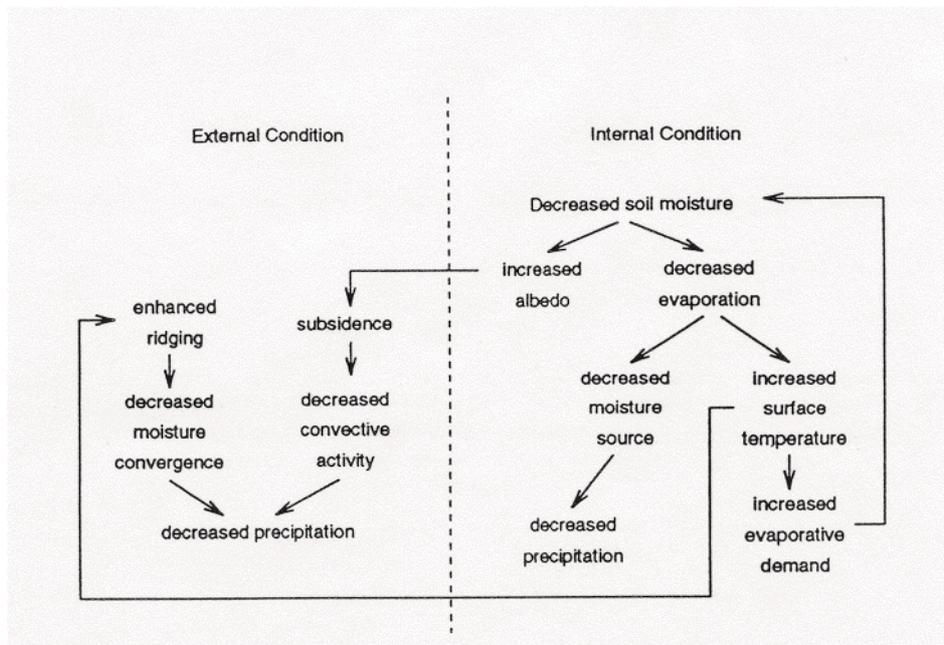


Figure 2. Summary of external dynamic processes affecting precipitation (left) and internal feedbacks involving soil moisture (right) (after Meehl, 1994).

An anomalous general circulation feature may be a necessary condition but it is not a sufficient one for the development of a severe drought. Feedback mechanisms are what transforms an anomalous perturbation into a persistent and prolonged hydrologic condition. The identification and understanding of these feedbacks is one of the main scientific challenges of the field.

The anomalies present on the precipitation signal propagate through other phenomena of vital hydrologic importance such as runoff, soil moisture, streamflow, groundwater

levels, etc. Figure 3, after Chagnon (1987), illustrates the propagation of perturbation in precipitation through the land branch of the hydrologic cycle. It is in this propagation process where a wide range of crucial feedbacks between the different phenomena and processes occur. These feedbacks may, in turn, affect the atmosphere and the precipitation signal and thus cause conditions which lead to a persistent and prolonged drought.

A key process in the above analysis is the soil moisture supply. This variable is crucial in the large scale surface heat and moisture balance between the land and the atmosphere. Soil moisture also has a much longer memory than the original input precipitation. This longer memory will be crucial, through large-scale spatial feedbacks, to the temporal persistence of wet and dry periods.

The perturbations in key forcing parameters that influence the general circulation and initiate droughts may be of natural origin (e.g., shift in position of the intertropical convergence zone) or of anthropogenic character (e.g., increase of carbon dioxide, large scale deforestation).

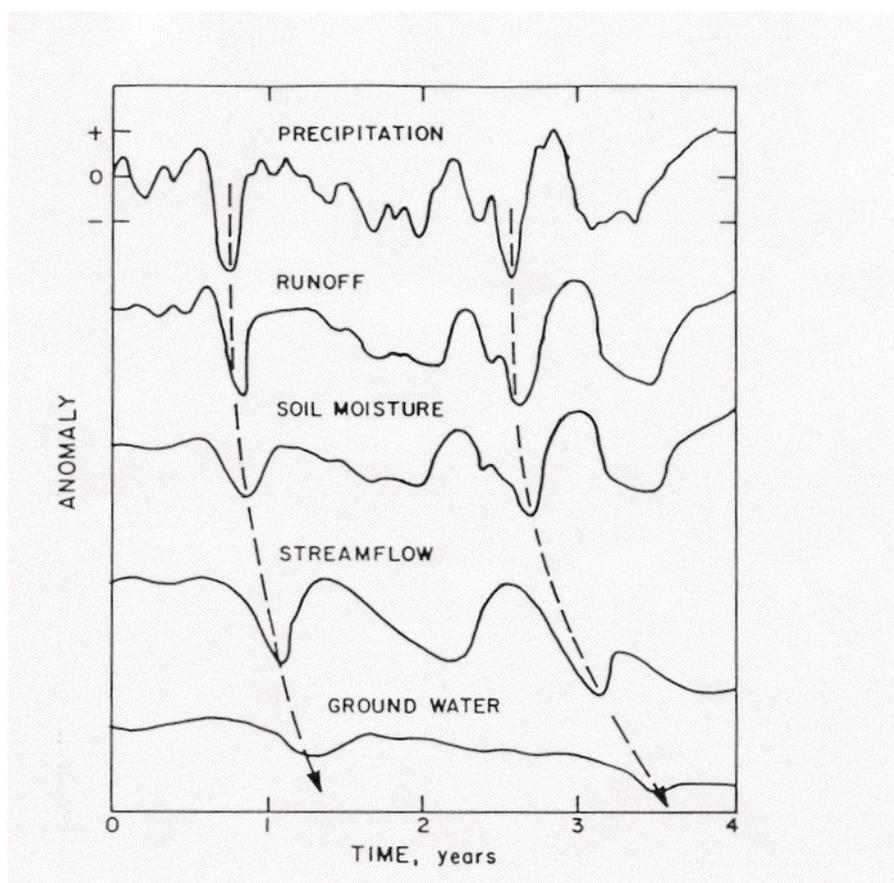


Figure 3. The propagation of a perturbation in precipitation amount through the land branch of the hydrologic cycle (after Chagnon, 1987).

Deforestation and Climate Change

A clear example of the impact on regional climate change by the land branch of the hydrologic cycle comes from the large conversion of forests into pastures or annual crops. Extensive studies of the effects of large scale deforestation have been carried out using GCMs coupled with models of the biosphere. Shukla et al. (1990) investigated the effects of Amazonian deforestation in the regional and global climate. They found dramatic changes when the Amazonian tropical forests were replaced by degraded grass in the model. These changes were associated with a significant increase in mean surface temperature and sizable decreases of annual evapotranspiration, precipitation, and runoff. The differences were greatest during the dry season and the deforested case was associated with larger diurnal fluctuations of surface temperature and vapor pressure deficit. Such effects have been observed in existing deforested areas in Amazonia. Figure 4 shows an example of the previously described results. Particularly important is to notice that the calculated reduction in precipitation (Figure 4c) is larger than the calculated decrease in evapotranspiration (Figure 4d). This implies that the dynamical convergence of regional moisture flux also decreased as a result of deforestation.

Nobre et al. (1991) also found for the case of Amazonian deforestation that the length of the dry season increases with respect to the forested case. They point out that this could have very serious implications for the survival of tropical rain forests since they only occur when the dry season is very short or non-existent.

The above type of results quantitatively indicate that deforestation is clearly a process with strong feedback reinforcement and with direct implications to droughts which may ultimately lead to desertification conditions. Desertification is an extreme condition characterized by the diminution or destruction of the biological potential of the land which leads finally to desert-like conditions. The principal desertification processes are: degradation of the vegetative cover, accelerated water and wind erosion, and salinization and water logging. The resulting temporary or permanent loss of soil productivity is only one part of the environmental damage. Downstream flooding and lowering of groundwater tables alter local components of the hydrologic cycle (Dregne, 1987).

Impact of Hydrologic Fluctuation on the Persistence of Wet and Dry Periods

Precipitation water is derived from both land evapotranspiration and atmospheric vapor advection. By the former mechanism land hydrology influences its own forcing and thus large-scale water balance. Figure 5 shows a schematic of this where the total precipitation over a large region, P , is made up of two components, the local one - P_m - whose water originates from evapotranspiration in the region and the advective component - P_a - which originates outside the region.

The highly nonlinear dynamics shown in Figure 5 was studied in detail by Rodríguez-Iturbe et al. (1991a, b). A crucial feature of the dynamics is the impact of moderate fluctuation in the local component of precipitation over the evolution of the soil moisture in the region.

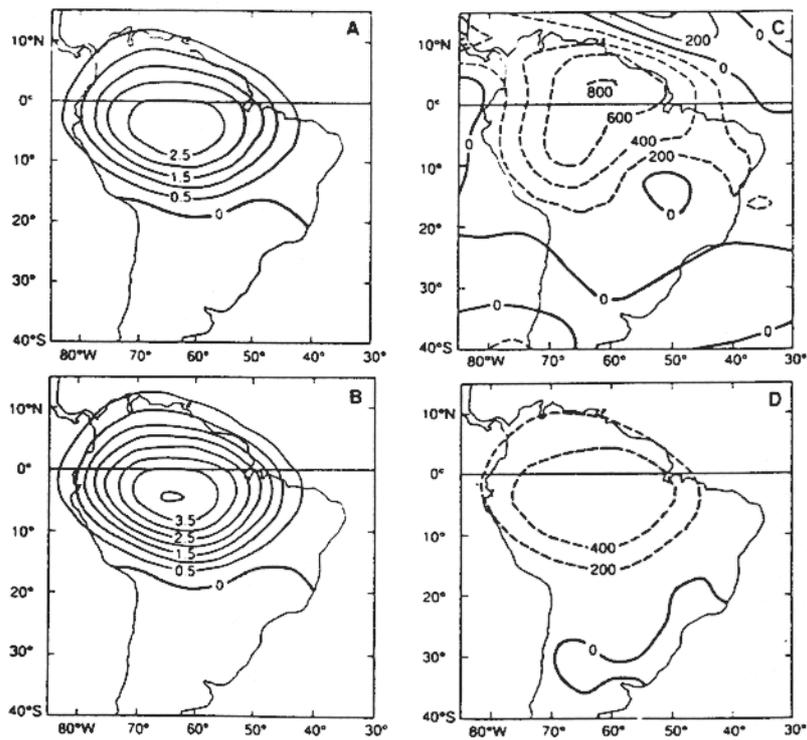


Figure 4. Differences between 12-month means (1 January to 31 December) of deforestation and control cases (deforested-control) for the South American sector: a) surface temperature increase in degrees centigrade; b) deep soil temperature increase in degrees centigrade; c) total precipitation changes (dashed line indicate a decrease) in millimeters; and d) evapotranspiration decrease in millimeters (from Shukla, Nobre, Sellers, 1990).

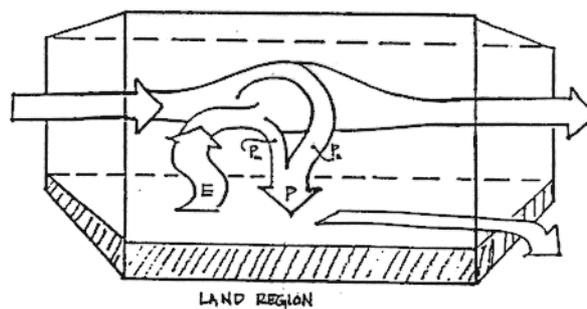


Figure 5. Precipitation water is derived from both land evapotranspiration and atmospheric vapor advection. By the former mechanism land hydrology influences its own forcing thus large-scale hydrologic balance becomes a nonlinear process (Entekhabi, Rodríguez-Iturbe and Bras, 1992).

Fluctuation throughout time on P_m cause transitions to occur and the system to shift states. These transitions may be very important in the characterization of the hydroclimatology of large regions. The soil moisture instead of fluctuating around a mean will now oscillate between several modes of its probability distribution. Thus in regard to its temporal evolution, the soil moisture will tend to lock itself around the value of one mode but with a strong enough fluctuation in the climate it may then shift to the other modal behavior and will remain there until a large climatic fluctuation shifts it back to the previous mode. The hydrological, ecological and agricultural consequences of this long-term behavior may be quite important. Also very important is the average time of residence of the soil moisture around the values corresponding to the different modes.

Figure 6 shows an example of the above dynamics where the probability distribution of soil moisture evolves, under the influence of noisy fluctuation, from a unimodal type to a bimodal type when the system will experience long periods of wet and dry characteristics.

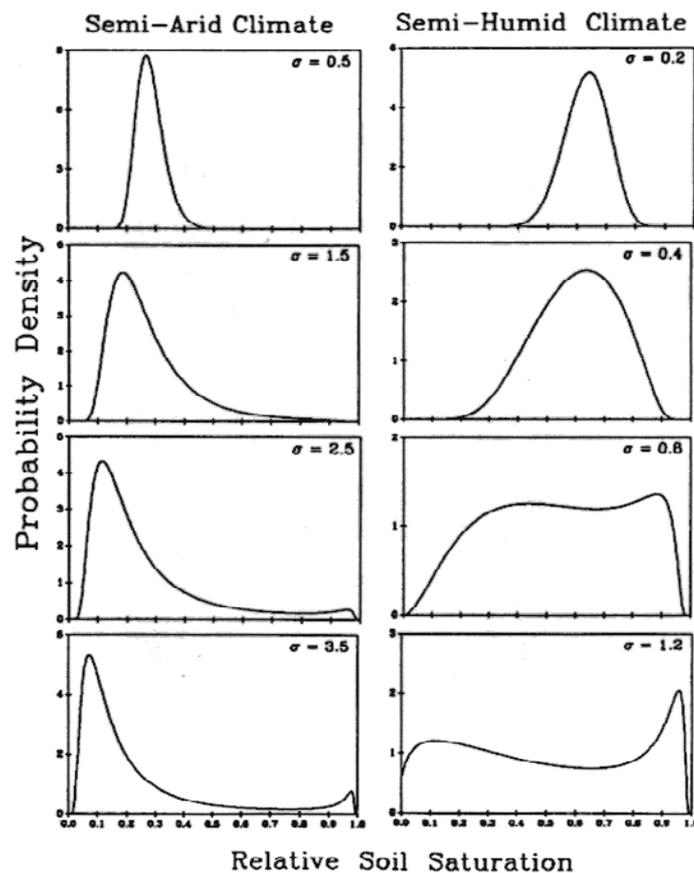


Figure 6. The steady-state probability distribution function for soil moisture in both climate cases (column 1; semiarid; column 2: semihumid). With low amounts of variance σ_2 , the distribution is near-Gaussian around the fixed equilibrium value which would result from the deterministic ($\sigma = 0$) situation. With successively larger amounts of variance, the distribution traverses a larger domain and develops multiple modes in both cases (from Entekhabi et al., 1992).

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SUSTAINABLE DEVELOPMENT – FROM RESPONSIBILITY TO OPPORTUNITY

by George D. Carpenter

It is a privilege to be here today in the company of so many respected professionals in the water field.

My remarks today are not specific to water, but to the whole way we in business and industry think of our role in sustainable development. First, I will look back at what the business community has accomplished over the past fifteen years, and what still remains to be done. Then, I want to look forward to an expanded role for business, one of moving from a responsibility focus to one based on opportunity. I will look at how linking opportunity with responsibility brings with it a breakthrough level of contribution to society, as well as the potential for a breakthrough in the business case for sustainable development.



As we approach the World Summit on Sustainable Development, WSSD, in Johannesburg, now less than two weeks away, it has become fashionable for many to say that not much has happened. It is as if the only way to justify your continued existence and programs is to first declare failure. Now as someone who has spent their entire 30 year career working in various aspects of Sustainable Development, I do not believe it is fair to say that not much has happened. In business, failure is a quick way out the door. Success in business comes from delivering on what you promise, and I believe the global business community has, in fact, delivered on what it committed to in Rio ten years ago, and more.

Ten years ago, the idea that you could manage the environment on a systemic basic across global corporations was a fledgling idea for many of us. But within 5-7 years after Rio, not only was corporate wide environmental management a reality for most large multinational corporations, but there was an international standard for systemic environmental management, and enterprises of any size could look in the phone book of any major city in the world and find a consultant to help them implement such a system.

Eco-efficiency was another new vision at Rio, and today it is a proven success. Total quality thinking and continuous improvement were applied to the environment and to worker health and safety. Many large corporations have now integrated worker health and safety with environmental management.

Looking back at my own company, P&G, over those same ten years since Rio, I can point with pride at how we reduced our use of packaging by 25%, were pioneers in auditing and the use of Life Cycle Assessment, have saved US\$500 million over the last 6 years by designing waste out, and have brought worker safety to our best ever performance levels.

This is not to say our job is complete. There is still much to do such as making environmental, health and safety management the norm for small and medium enterprises, and moving beyond environment to Corporate Social Responsibility... human rights, communities, employees and our supply chain. But we should take pride in all that business has accomplished since Rio, and in knowing we can change how business is done in a relatively short time.

But, if we look back at the last 10 to 15 years, we see that all we have accomplished has been about RESPONSIBILITY. It has been about fixing what is bad and what people do not like about business. It has been about reducing and eliminating the NON-VALUE-ADDED parts of business.

Many have spent a lot of time trying to understand and articulate the business value of sound environmental, and now socially responsible, operation. To be sure, eco-efficiency, eliminating waste and risk that adds no end value to your product, has a bottom line value. I previously described how that has meant a cumulative US\$500 million for P&G over the last six years. But, we have never been able to show how sustainable development could contribute to top line shareholder value because we could never show how it created new business, new customers, new markets.

Why would we ever, in the first place, think we could build "TOP LINE" shareholder value, when we were never creating NEW VALUE. When all you do is remove what is bad from business, by definition you can never be good. The best you can be is less bad than your competition. I believe this explains the failures of green marketing in the 1990s. We were never creating new value, only getting rid of what was not wanted in the first place.

Looking forward, at P&G we look at sustainable development being about a better quality of life for everyone, now and for generations to come.

Business is about innovation, making life better for our consumers and customers, creating wealth.

Better quality of life... innovation... making life better for consumers... creating wealth! Can you begin to see how creating new value can relate to sustainable development? Do you see the synergy between sustainable development and what business is all about? Can you begin to see OPPORTUNITY for your business here?

We can never lose sight of our RESPONSIBILITY... to our communities, the health & safety of our workers, our role in furthering human rights, and our obligation to develop our employees. But, we should also begin to look for the OPPORTUNITY that can be

found in solutions for safe drinking water, childhood nutrition, sanitation, women's emancipation. We can find OPPORTUNITIES for the long term sustainability of our businesses by helping create a better quality of life for everyone, now and for generations to come.

Let me approach this subject from a different direction. A couple of weeks ago I pulled out a copy of the United Nation's Millennium Goals and highlighted those that I thought P&G might impact or could impact.

When we see our role only as being part of Corporate Social Responsibility, we impact a handful of those UN Goals by getting our own operations in line with society's expectations. If we expand our thinking to include corporate philanthropy, we impact a few more goals by giving money and volunteering time to causes like education and disease treatment and prevention. Both of these, corporate responsibility and philanthropy, fall on the RESPONSIBILITY side of this analysis because they are not the reason we exist as a business.

Let's consider for a moment, how we could do good for society and build our business at the same time. One way to do that is to use cause-marketing promotions as a means to build sales, while generating money for worthy causes. For example, P&G's fabric and home care business has successfully partnered with UNICEF to build market share in Spain, Portugal, the UK and North America, while providing 11 million tuberculosis vaccinations in Africa.

Let's go a step further. How about developing an affordable, clinically proven product that would solve childhood micro-nutrient nutrition, or clean the dirtiest river water to drinking water standards, or reduce the time it took women and girls to do household tasks such they had time for school or to start a business? In the process of entering these new business ventures, we would need to further develop capacity and capability at a national level to manufacture these products at a cost our new consumers could afford, and in urban slums to distribute and sell our new products. Now we are beginning to talk about creating new value by contributing to a better quality of life for new consumers, in new markets.

Not every idea has to be a big one. Sometimes simple things can make a difference in a person's life. It can be a small appliance that makes daily chores easier, or reduces the amount of water that has to be carried a kilometer to the home.

Tomorrow, in the plenary session, I am going to talk about applying this OPPORTUNITY mindset to meeting the UN Millennium Goal for safe drinking water. But today, I will use an example from our beverage business.

Worldwide, over half a billion people suffer from micro-nutrient malnutrition... the deficiency of vitamin A, iodine and iron in their diets. About 250 thousand children go blind every year. Their growth is stunted. IQ's in populations who suffer from this deficiency are 10-15 points lower. Work force capacity is reduced by as much as 40%.

P&G took a technology we had that allowed these three micro-nutrients to co-exist together, and created a low cost drink mix, that has been clinically proven to be effective in treating micro-nutrient malnutrition. When UNICEF conducted clinical tests of this product, in only six months time, children drinking NutriStar grew 0.7 centimeter higher, and 0.8 kilograms heavier. We are now successfully in the market with this drink in Venezuela, as an example of Sustainability Through the Market (to coin a phrase from the World Business Council for Sustainable Development)

Wrapping Up

In 1992 at the Rio Earth Summit, business set forth a systemic approach to our environmental responsibility. We have delivered in making such a systemic framework a reality. We are well along in changing business culture and results as part of our responsibility to society.

In 2002 at the Johannesburg World Summit on Sustainable Development, business must look beyond just RESPONSIBILITY to a vision of Corporate Social OPPORTUNITY, with RESPONSIBILITY. We must move from a mindset of making things LESS BAD, to a mindset of how will life be BETTER because of the new value we will create.

**ICC'S COMMISSION ON BUSINESS IN SOCIETY:
MAKING POSITIVE AND RESPONSIBLE CONTRIBUTION.
REPORT FROM THE INTERNATIONAL CHAMBER OF COMMERCE**

by Erik Belfrage



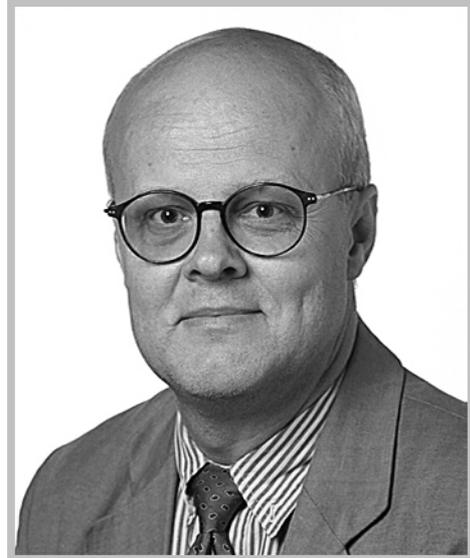
We regret that his full paper was not available as of the date of this printing.

CONCLUSIONS

by Magnus Enell

Honourable laureate, ladies and gentlemen, speakers, panel participants, and audience

My honourable duty at this Founders Seminar year 2002 is to make a 10 minutes conclusion of what we have listened to during the last 170 minutes. It is an interesting, challenging and pleasant duty. The title and topic of the seminar is “Corporate Responsibility to Facilitate Sustainability in the Water Sector.” Perhaps it would be more correct, after listened to the speakers and the panel debate, to title the seminar “Corporate Responsibility to Facilitate Sustainability in the Business Sector.”



I will start with a synopsis of the scientific part of the seminar – professor Rodríguez-Iturbes interesting speech. The importance of hydrology knowledge for all development activities is crucial when we plan and conduct actions for the present and the future. We got an in-depth information about the effect of drought and wet periods. Drought is a complex phenomenon that can be defined from several perspectives. In drought analysis both the amount and timing of precipitation are of great importance. An important negative consequence of droughts is desertification. Further, we were informed that the present equilibrium of the water and energy cycles over large regions is related to the present vegetation cover. Sizeable changes in the plant cover will have comprehensive negative effects of the two cycles. Of certain interest and importance is in this case for example the CO₂ increase, as an initiation of droughts.

The US-example with a 15-25 % increase in needed irrigation in the agricultural sector, if we get a temperature increase of 3 °C without or with a 10 % precipitation increase, is scaring.

That was the scientific part of what we have heard at this seminar. The following speeches and the panel debate were more based on practical experiences and the necessary need for a change in the business sector. Sustainable development is a responsibility proactively implemented in a number of corporations' daily work.

From Procter & Gamble we heard that the business sector has delivered what it promised at the Rio conference 10 years ago. What has the business sector delivered?

- Implementation of environmental management systems.

- Started to work with eco-efficiency and pollution prevention.
- Adopted the concept of total quality environmental management.
- Integrated health and safety issues with environmental aspects.

But there are still lots of issues to work with and a need to enhance the knowledge and consciousness about;

- Human rights
- Communities
- Employees
- Supply chain

The last three of these bullet points are strongly connected to the stakeholder dialogue or the partnership building.

George Carpenter, from Procter & Gamble, also described the change in business way of working – going from responsibilities to actions, measures and changed behaviour to opportunities. The combination of Corporate Social Responsibility, Charity, Cause Marketing, and Products and Services is an excellent example to tackle the US millennium goals.

Today we are in a period when proactive corporations have found that it is good for the business to go beyond responsibilities.

From the International Chamber of Commerce (ICC), representing about 10,000 corporate members, present in 140 countries, we heard that the definition of Corporate Social Responsibility (CSR) is not self-evident. Different cultures mean different definitions. However, the ICC proposes the following general definition – the voluntary commitment by business to manage its activities in a responsible way.

The brand name, brand value, identity and image. This is a very valuable and fragile part of a company – easy to destroy by behaving incorrect and wrong. We have listened to a number of companies with very strong brand names – Procter & Gamble, ITT Industries, ITT Flygt, Seven Trent and KPMG. And all of them are aware of the importance to behave correct to keep the level of the brand name, or even enhance the name.

It is important for a company to set its own agenda, and there is no agenda that fits all. The ICC Charter for Sustainable Development is an important and wanted document for the business sector. But, an increasing number of national and international codes create a problem. It is not possible to define one code that fits all companies. Each company must create its own codes, ethic and core values, vision, mission, policies etc.

And – to work with sustainable development in a company is a continuous and dynamic process. Why is a responsible business conduct necessary?

There are a number of benefits connected to legal and political issues, relations to different stakeholder groups, organisational issues, and finally of course economic and financial benefits.

Another benefit of great importance is “future employees”. Within 10-15 years lots of employees in European and US companies will retire. Therefore, there is a need for the next generation to come in and step up one or two level on the ladder. These successors will present new requests for why being and staying as an employee at a company. It is not only the level of the salary that is of importance, also social aspects are considered.

I would like to repeat what President Robert Ayers from ITT Fluid Technology presented at the Stockholm Water Symposium here in Stockholm two years ago – five of his seven catalysts for change;

- Establish clear and objective rules
- Nurture innovations
- Prioritise needs
- Reward small-scale solutions
- Spread global best practices.

These five catalysts for change have been on the agenda for today’ seminar.

The panel debate gave us an insight into some differences in the reception and the belief of the business way of working and the output of the practical work done.

What about companies that are defensive, reactive, proactive or active?

We are in a major transitional change, regarding companies turning from defensive and reactive to being proactive and active. The companies present not only with representatives at the panel debate, but also companies in the audience are good examples of the new type of companies; proactive and active.

I have nearly forgotten the nine practical steps to work with the concept sustainable development, described by the ICC;

1. CEO statement
2. Company purpose and values
3. Key stakeholders
4. Business principles and policies
5. Implementation of management systems
6. Benchmark against other codes and standards
7. Internal monitoring/external reporting
8. Understandable language
9. Pragmatic and realistic objectives

The seminars’ audience stressed the importance external reporting. The Global Reporting Initiative (GRI) was stressed both by the panel and by the audience to be not

only an interesting initiative, but also to be the global way for companies to conduct communication in a transparent and multi-stakeholder way. The GRIs Guidelines for Sustainability Reporting is recommended to be in-depth evaluated by companies for their future reporting content and strategies.

How can we enhance the interest by small and medium sized companies to work with the sustainable development concept?

- Continue to develop technology more cost-effective and simple solutions
- Develop corporate opportunities
- Continue to develop the internal information management system, and external verification
- More true environmental protection
- More companies in the west moving to the east
- What metrics to use to really describe the sustainability status



Panel discussion: (left to right) Mr. Louis J. Giuliano, President and CEO, ITT Industries, USA; Mr. Brian Duckworth, Managing Director, Severn Trent Plc., UK; Dr. Anna Blomqvist, Manager, KPMG Sustainability Assurance and Advisory Services, Sweden; Professor Takashi Asano, 2001 Water Prize Laureate; Mr. Erik Belfrage, Senior Vice President, SEB, Sweden; Dr. George Carpenter, Director, Corporate Sustainable Development, Procter & Gamble, USA and as moderator Mr. Claes Sjöberg, Tomorrow Media.

Dear seminar participants, this was my conclusion of the seminar. It was an encouraging amount of information and statements we have listened to. It is with great confidence we will follow the work with sustainable development within the business sector, not only for the companies we have listened to today, but also to the business sector in general. But why must we restrict to the business sector alone, why is not the concept also valid for other sectors in the society. Yes, it is valid for all of us!