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Coastal Lowlands: Geology and Geotechnology

Opening address by the President of the Royal Geological and Mining Society of the Netherlands (KNGMG)

Ladies and Gentlemen,

As president of the Royal Geological and Mining Society of the Netherlands, it is an honour and pleasure for me to welcome you to this symposium, celebrating the 75th anniversary of our society.

At the opening ceremony, nothing would seem more appropriate than to look back over the last 25 years since the 50th anniversary, a period of dramatic change and development in the earth sciences, both internationally and here in The Netherlands.

Let us begin by considering the very foundations of our subject. The past 25 years has seen a revolution which has drastically changed our understanding of the earth, how it works at present and how it has evolved. In a very short period, our thinking in geology and geophysics has undergone a profound change. Many observations which hitherto could not be understood, fell suddenly into place. This revolution, comparable perhaps with Darwin's theory of evolution in biology, or the theory of quantum mechanics in physics, in my opinion represents a once-only step in thinking for the earth sciences. In other words, it is unlikely that a similar revolution in earth sciences will ever take place again. The theory, usually referred to as plate tectonics, was conceived in principle in the same year as our 50th anniversary, that is in 1962. In that year a paper by Harry Hess, entitled 'The History of Ocean Basins' was published, proposing the concept now known as sea floor spreading whereby the crust of the ocean floor is created in the central part of ocean ridges, from there spreading away at a speed of a few centimetres per year. Thus the whole ocean floor was formed in less than 200 million years. This was a completely new concept and formed the starting point for many breakthroughs – the interpretation of the magnetic stripe pattern of the ocean floors, the existence of subduction zones in which the oceanic crust is destroyed again, the role of fracture zones as transform faults, and the idea that the earth's lithosphere consists of a number of moving, rigid plates on which the continents are passive travellers. Then, of course, there is the concept of the Wilson cycle which I have long argued could equally well be called the Van Waterschoot van der Gracht cycle. Although it is tempting to dwell on this subject somewhat longer, I shall leave it with only one remark, namely that the impact of this intriguing new idea only became visible in our society's journal 'Geologie en Mijnbouw' some ten years after it was first conceived. Nonetheless, it does not mean that Dutch earth scientists are so far behind in international developments, as it was also in 1972 at the International Geological Congress in Montreal that the real excitement of plate tectonics became widely apparent. There can be no doubt that in retrospect the past 25 years have been very exciting indeed for any earth scientist!

Let me now turn to the local scene and consider the fate of earth sciences at our universities in The Netherlands. In 1962, five institutes of earth science existed in The Netherlands of which the fifth one at the Free University was only a few years old. In addition, mining engineering, geology and geophysics was taught at the Technical University at Delft, and geology and soil science at the Agricultural University at Wageningen. At that time, staff positions and financial resources were still expanding in all universities. Alas, in 1965 a letter from the then minister of education and sciences signalled the beginnings of a darker, tumultuous decade, bringing with it successive policies of selective contraction and amalgamation, with the emphasis on contraction! After a long period of hot, sometimes bitter discussions amongst the earth scientists, lasting until 1971, a decision was finally made to merge the geological institutes of Leiden and

Utrecht. The two Amsterdam departments were to realize intensive cooperation, with two small institutes remaining at Leiden and Groningen. Delft and Wageningen escaped this ordeal. After a period of frequent and difficult meetings the two institutes of Leiden and Utrecht moved into a new building on the campus of the University at Utrecht in 1979, thus forming one of the largest earth science institutes in Europe. However, more reductions lay ahead. Soon the vestigial institutes at Leiden and Groningen were closed, and recently the two Amsterdam institutes have been forced to merge. At present, the institute at Utrecht is being drastically reorganized due to the smaller influx of new students. This means that scientific and non-scientific staff will be reduced by about 15% in the coming years involving the forced discharge of a large number of people. However, if no further reduction in personel and financial resources is imposed, this institute with a better balance between geology, geophysics and geochemistry still has the potential of being an excellent research centre. However, this is not the end of the bad news. The department of soil science and geology of the Agricultural University of Wageningen is under serious threat of being curtailed. Also the mining department of the Technical University at Delft has seen its funds cut. In conclusion I have to express my serious concern about the state of earth sciences at universities. Further reductions could easily lead to a situation below the critical mass required to guarantee teaching and research at an adequate level, and would in my opinion be utterly and finally disastrous.

In contrast to the universities, the Netherlands State Geological Survey has fared rather well in the last 25 years. This is mainly due to the discovery of oil and gas both on- and offshore in The Netherlands. The survey increased its staff substantially until 1985, and only since that time have reductions in personnel begun.

The earth sciences have played a dramatically predominant role concerning the energy situation in our country in the last 25 years. In 1960 the large gasfield of Slochteren was discovered, and proved to contain a very large supply indeed. As a result coal mining was no longer profitable, and in 1965 the government decided to close all coal mines in South Limburg, even abandoning the shaft of the new Beatrix mine which just had been constructed. Over a period of ten years, all mines were closed down. This process not only had a large impact on the economy of South Limburg, resulting in a serious unemployment problem, but also had major consequences for the Technical University at Delft and our society. The mining department at Delft which traditionally was geared towards coal mining, found itself without some of its traditional industrial connections and with reduced employment possibilities for its students. As a result, it changed emphasis to the petroleum industry. For our society, this meant a considerable change in our journal 'Geologie en Mijnbouw', as advertisements for mining equipment disappeared completely, and articles on mining dwindled to the extent that the journal is now much more oriented towards geology. However, we strongly believe in fostering relations between earth scientists and mining engineers and we hope that the latter group will once again come more to the fore in future.

The discovery of the Groningen gasfield in 1960 was for a large part the result of work done by earth scientists, geologists and geophysicists. It took several years before its huge size became known and in the middle of the sixties production on a major scale started. It meant not only a large source of profits for the state and the two petroleum companies involved, it also improved the standard of living in this country. It enabled for instance, the installment of central heating in many homes, a luxury which up to that time was only available to the privileged. Besides the Groningen gasfield, numerous offshore operations in the North Sea have improved the energy situation of The Netherlands tremendously.

Coming back for the moment to the difficult position of the universities, it is quite clear that no other science has made such a large contribution to the state economy as the earth sciences via its role in the subsurface survey of The Netherlands and the discovery of oil and gas. Since 1965 the government has cashed in around 180 billion guilders from the Groningen gasfield! In the same period, the costs of running our earth science institutes amounted to a mere 1/10 of a percent of this sum. In this context it is most disappointing and depressing to note that successive governments have done so little to guarantee the quality of teaching and research in earth sciences in the country.

In the last part of my speech I would like to return to the International scene. 25 Years ago the first major international earth sciences cooperative program, called 'The Upper Mantle Project' had just started. It lasted until 1970 when it was succeeded by the Geodynamics Program, which in 1980 was itself replaced by the International Lithosphere Program. These major projects were established by the International Council of Scientific Unions and sponsored by the two large earth science unions, the International Union of Geological Sciences and the International Union of Geodesy and Geophysics. Such programs aim at close cooperation between geologists, geophysicists and geochemists in order to understand the dynamics and evolution of the earth. Each of these large projects has had a special theme: the upper part of the earth's mantle, the study of the oceans and ocean floor in the Geodynamics Program, whereas the current program is concerned with the lithosphere and is mainly geared towards the continents. It is encouraging that in all these projects Dutch earth scientists have participated or are still participating, sometimes in important functions. This clearly shows that we have not lost our contact with the international scientific community.

I think I have now more or less completed my aim of providing a short history of events during the last 25 years in earth sciences within and outside The Netherlands. Scientifically it has been an exciting time, and we are privileged to have witnessed fantastic progress in the understanding of our planet. The same applies to the geology of The Netherlands and the discovery of its major energy resources. However, the period has not been a happy one for many Dutch earth scientists. They have been badgered by too many organisational problems due to government and university measures; they have been forced to spend too much time in meetings negotiating, instead of doing science. Many have been too concerned about their futures to function effectively. Talking about the future, what lies ahead in the next 25 years? What will my successor have to say at the centenary of our society? Of course, I do not know, but I cannot help feeling that despite the many interesting scientific discoveries which will certainly be made with new techniques and technology, progress will not be as exciting as in the past 25 years. Another Groningen gas field? Perhaps, but unlikely. And for the university scene, I can only hope that a quieter period will lie ahead so that we can concentrate and keep up with international standards.

And how about the long-time future? We know that our country has been subsiding for a very long time. It is unlikely that this process will stop in the near future; and the near future for a geologist is always counted in millions of years. The presently rising sea level makes the situation worse. However, sea level changes cannot yet be reliably predicted and have shorter wave lengths than vertical movements of the land. The growth and decline of ice caps and glaciers are of course one of the determining factors. At present, it seems likely that we will have to build our dykes higher and higher to prevent us from drowning. For that reason the subject of our Jubilee symposium 'The Geology and Technology of Coastal Lowlands' could not be more appropriate. What we need to know is what has happened in the past, where did it happen, when did it happen, and why did it happen? I am sure that some answers to these questions will be given during the next three days.

Ladies and gentlemen, distinguished guests of the society, with this statement I declare the Jubilee symposium open.

H.J. Zwart