

# SPOTLIGHT

## on engineering and the environment

by COLIN M. SPENCE\*

The Federation of Societies of Professional Engineers (FSPE), in collaboration with the Habitat Council and the Environmental Planning Professions Interdisciplinary Committee (EPPIC), held a Symposium on 'Engineering our Environment' at the Rand Afrikaans University on 5th June, 1984, under the chairmanship of Mr Colin M. Spence, Vice-President, to commemorate World Environment Day.

### Main Addresses

The principal speakers were as follows:

- Mr Keith Cooper, Chairman of the Wildlife Society, who spoke on 'The Effect of Engineering on the Natural Environment'.
- Mr Ron Jackson, Consulting Engineer, who spoke on 'Engineering to protect the Natural Environment'.
- Mr Gawie Fagan, Architect, who spoke on 'The Deprivation of the Manmade Environment'.
- Mr J.R. van Deventer, Professional Engineer and Chairman of EPPIC, who spoke on 'Managing the Conflict between Development and Conservation'.
- Mr James Clarke, Assistant Editor of *The Star*, who spoke on 'The Future of Natural and Manmade Environments'.

### Mr Keith Cooper

Air, water, soil, plants, and animals are the key elements of nature that interact with one another to provide a stable eco-system. Many engineers and their support staff in the engineering industry seem to be quite unaware of this important fact and consequently have little regard for the preservation of natural systems.

The development of modern automotive transport vehicles and the building of roads and railways have done more damage to the natural environment than any other form of engineering activity.

Zaire has set aside 16 per cent of its total land area for conservation. It is vital that South Africa's present nature reserves remain untouched by development in order to ensure the preservation of at least some pristine wilderness and natural areas for future generations.

Engineering constructions such as freeways, dams, and harbours should never be undertaken without due regard for their effects on ecology and the environment.

### Mr Ron Jackson

Our environment is constantly changing because of the

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interaction of forces such as the influences of geology, climate, and various species.

It should also be appreciated that there is a hierarchy of human-induced changes that starts at the top with the consumer and passes downwards through public-sector agencies and private sector entrepreneurs to the engineer, who is merely an agent of the others. He is given a budget and has to work to that.

A lack of environmental consciousness has been blamed on the engineer, but this can equally be said of the other members of the hierarchy. The vast scale of present changes has significantly altered the impact of change in the modern world.

With regard to the deleterious effects of population pressure, the attitude evinced by Indira Gandhi is significant: she said 'There is no pollution equal to poverty'.

However, development authorities of various kinds are now showing marked signs of environmental awareness. For instance, the South African Institution of Civil Engineers has held two conventions with the environment as a basic theme.

'Environmental Impact Studies' are becoming the norm rather than the exception, and it can be said that the study of environmental effects has now become a regular part of design activity. The study of numerous alternative solutions for major engineering constructions, in consultation with scientific studies of various kinds, is gradually becoming part of the function of the engineer.

### Mr Gawie Fagan

The educational background of the engineer reveals a serious lack of studies in aesthetics and environmental considerations. The modern engineer is being trained as a narrow technologist compared with past giants such as Leonardo da Vinci, Thomas Telford, John Rennie, Robert Stephenson, and Isambard Brunel. These men demonstrated the desire to build aesthetically beautiful structures in accordance with high ideals and appropriate economy.

Engineering should, however, be seen to be intimately connected with architecture, and the education and training of engineers should be improved to take account of this.

The impact of the municipal engineer on the environment of the city has often been baleful. The technocratic illusion that the man-made environment can be an image of scientific order ignores the fact that cities are the result of traditions, contradictions, varying influences, and a 'limitless tolerance for individual values'.

Examples of bad engineering include roads built with large-scale cutting and filling in place of less environmentally destructive bridges, docks and harbour facilities built

in environmentally sensitive areas, power stations erected too close to areas of habitation, excessive standards and widths for minor roadways.

However, it is recognized that engineers are now becoming more 'environmentally aware': some recent bridge designs, for instance, have shown a fine aesthetic sense. It is a pity that powerlines and telephone routes are not designed with similar considerations in mind.

What seems to be required is a generally applied sense of the engineering profession's wider responsibilities, probably through improved education methods. The very holding of this Symposium is indicative of a new spirit that will, it is hoped, lead to a diminution of destructive engineering in our environment.

*Mr J.R. van Deventer*

The Environmental Planning Professions Interdisciplinary Committee (EPPIC) was established in 1974 in order to advise engineers, architects, and planners how to handle the conflict between development and conservation.

EPPIC has been responsible for the production of very useful and significant philosophical and procedural guidelines on how to protect the environment. There is clearly a need for a change in attitudes and for more participation by the community. The handling of this conflict requires appropriate education and training, not only at graduate level but also later on in the engineer's career as part of his 'continuing education'. It must be appreciated that, although people like beauty and amenity, they also demand their creature comforts and convenience. The provision of the latter can give rise to problems for the former.

Negative influences on the environment cannot simply be removed or avoided altogether: they can only be 'optimised': in other words, a balance must be struck between preservation and development.

One important factor is that engineers will have to learn to talk to people, because the ordinary members of the community have moral rights as well as statutory ones. It is the moral rights that have to be given more consideration.

It is not satisfactory to try and apply conservation methods once decisions have already been taken. Environmental considerations must be taken into account from the very beginning of projects. In order to ensure this, it is proposed to establish a Code of Conduct for all the planning professions and to provide continuing education facilities for all practising engineers. This can best be achieved by the joint efforts of FSPE, the Habitat Council, and EPPIC.

*Mr James Clarke*

Although the media and popular belief may seem to favour the rapid development of 'space age' solutions to the problems of living and transportation, these are unlikely to be achieved in practice.

The population explosion shows signs of slowing down, and the pressure on available land spaces is not likely to be as serious as some commentators have warned. 'Face to face' contact between people will continue: the computer and electronic gadgetry will not be able to replace this, and

there will be a steady re-humanizing of living and working conditions, away from the highly concentrated 'concrete jungle' towards low-rise park-like developments.

Technological advances have served to encourage a return of cultural awareness, and the demand for improvements to the environment will grow rather than diminish. Moves in this direction are being generated 'from the bottom up'; that is, by ordinary folk, not by public authorities. A good example of this is the establishment and preservation of the Braamfontein Spruit Trail, which involves 13 abutting local authorities.

There is a strong trend towards more autonomy at local level and towards decentralization, and away from big city bureaucracy, which will in turn encourage more public participation.

However, we have to accept that cities will not change much: we shall continue to have the motor car and individual transport systems. What we need to work for is a multiplicity of smaller parks, open spaces, and reserves of various kinds — rather than a few large ones — in order to bring these amenities closer to the people.

Urban living will remain the pattern of the future, and the quality of life will continue to improve steadily provided that we can re-order our priorities to suit the real needs of humanity.

#### *Subsequent General Discussion*

Dams can act as silt-traps and thus prevent inundation of valuable agricultural land, but the best way of fighting such degradation must remain good land-use methods and the avoidance of erosion.

The importance of forest conservation in maintaining water supplies needs to receive attention. The increase of carbon in the atmosphere is a cause for concern, because of 'hot house' effects on agriculture.

The impact of social effects of different types of development on people's attitudes can be significant. Any comprehensive planning philosophy must therefore have regard for this. Public participation in the planning process is vital because the environment is not just 'out there'; it is all around us. Even unsubstantiated opinions are 'facts' that have to be taken into account.

However, in public-participation schemes, the public must be exposed to all the possible alternative solutions and told of all the relevant factors.

It is shortsighted to ignore the Third World in assessing future trends: the prognosis for these areas is not good, and conditions seem set to continue to deteriorate. South Africa is a mixture of First and Third Worlds side by side, and thus must expect trends in both systems.

In combating the destructive impact of technological development on natural and man-made environments, the first essential is *awareness* and the second the *will* to act effectively. It is to be hoped that this symposium will have contributed to both of these factors.

#### **Transcripts**

Full transcripts of the principal addresses are available from The Secretary, FSPE, P.O. Box 61019, Marshalltown 2107. Tel: 832-2177.