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## ECO-NUTRITION, ECOSYSTEMS AND HEALTH

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### Reflections and Aspirations

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#### **Abstract**

Our generation has had the privilege and opportunity to appreciate scientifically the ecosystems that we have occupied, transformed or left alone. Now we, with them, face an unprecedented crisis brought about from the rather short 150,000 years or so presence on Earth of our own so-called 'species'. The concept of 'self' and 'species', and its health, is now challenged by our science, by new concepts of bio-communication and by the known fragility of our ecology. But, our journey from childhood to later life with family, friends and colleagues, as health-care professionals, knowledge workers, teachers and citizens, may yet be one of an optimistic future, if we act locally under a global vision.

#### **Personal Reflections**

Reflections and aspirations in celebration of Tony McMichael's career and contributions are bound to be rewarding. Our lives had been entwined in several ways. With my late wife, Dr Soo Sien Huang, we were medical students together at Adelaide University. We moved to Melbourne at about the same time, with a similar sociopolitical mindedness. Tony and his wife, Judy, lived with us in Parkville, Tony as President of the National Union of University Students and me as a National Heart Foundation Fellow and tutor at Melbourne University and St Vincent's Hospital. We worked together in the evenings and on weekends in a then depressed district of Melbourne as General Practitioners, where families often slept in cold warehouses and universal health insurance was yet to arrive.

Basil Hetzel, who had been our Professor of Medicine in Adelaide, moved to Monash University as its Foundation Professor of Social and Preventive Medicine. I had kept in touch with him and brokered an arrangement whereby Tony could do a PhD with Basil. In due course, we both left Melbourne for overseas destinations. Ultimately, we teamed up again in the field of migrant health when the Division of Human Nutrition was created in Adelaide, with Basil Hetzel as Chief. I was appointed Foundation Professor of Human Nutrition at Deakin University.

I doubt that we understood where this was leading. But, there was a new synergy when Tony distilled his planetary health concept in 1993 (McMichael, 1993) and I began in the late 1980s to gather the evidence for biodiversity and food variety as integrated ecohealth pathways (Wahlqvist et al., 1989; Wilcox et al., 1990) critically affecting human history (Wahlqvist, 1992) and eventually formulating the concept of eco-nutrition in 1998 (Wahlqvist and Specht, 1998). Now and again, we shared a platform to corroborate these socio-scientific passions. When, as President of the International Union of Nutritional Science, I commissioned the New Nutrition Science initiative for integration between the biomedical, societal and environmental sciences, Tony was surely involved (Beauman et al., 2005; Wahlqvist, 2005; Cannon and Leitzmann, 2006). And so it is that I now reflect and hope.

## **Eco-nutrition for Food and Human Security**

Eco-nutrition conceptualises how we and other living things can acquire the nutrients we need to optimise our well-being, health and lifespan in ways that are sustainable and respectful of the animate and inanimate. The sense of connectedness and the need for diversity now, in the past and in the future, characterise eco-nutrition. Wahlqvist and Specht argue that eco-nutrition 'is the most critical conjunction of all the sciences for human survival, health and well-being' (Wahlqvist and Specht, 1998).

These authors identified ways in which biodiversity might contribute to successful eco-nutrition, which included an obligate varied food supply for human health; a range of diverse food sources as security against natural disaster, climate change and pestilence; a rich source of medicinals, many as yet unknown; ecosystem buffers against invasive plants and animals, and of pathogens and toxins; and a 'spiritual' value in diversity and ecosystems with mental health benefit and the feeling of 'belonging to the landscape'. Seasons would add diversity and vigour (Wahlqvist and Specht, 1998).

Because of the complex inputs into food and nutrition systems, they provide an opportunity to mitigate or amplify the risks posed by finite water, non-renewable energy, fertiliser, health, education and fiscal resources (Wahlqvist et al., 2012). These resource limitations are at the root of most human conflict. Therefore, greater emphasis on an ecological approach to food security should go some way to improve human security at large, while being attentive to planetary health. Expressly, it would seem time for the traditional security community to commit to ecosystem services as defined by the UN system.

## Connected Communities and Households: Food-based Systems

We are members of families, households and communities. We are conceived, born, raised, toil, reproduce, age and die as social and environmental creatures with varying degrees of health. Only for a few or in small part will health differentials be genetically determined in the Mendelian sense. This means that how locality and life-course intersect could be expected to be the principal determinants of health patterns, especially those that are seasonally, diurnally, nutritionally and microbiologically related. This situation merits an eco-nutritional nomenclature rather than the clichéd terminology of ‘communicable’ and ‘chronic disease’ (Wahlqvist, 2002).

There is increasing potential for communities to connect digitally in cyberspace and generate new problem-defining and solving strategies. In turn, this could revitalise what have come to be known as FBDGs (food-based dietary guidelines), which were formalised in Cyprus in 1995 by a joint WHO–FAO working party, with the intention of enabling food and nutrition policies to be locally and culturally relevant and sustainable (Wahlqvist, 2009).

## The Health of Species and Ecosystems

It is now evident that the boundaries between species are blurred in newly understood ways. First, our microbiome in gut, on skin, in the reproductive tract and more is greater than 90 per cent of our genome, and it is prokaryotic (has no nuclei) with an arbitrary interface with the environment. Second, environmental factors alter gene expression within each generation and intergenerationally, by epigenetic and non-RNA-producing DNA surveillance. Third, it seems possible that plant food micro-RNA or oligonucleotides, as in rice, can be assimilated in humans and alter, at least in a small fashion, metabolic phenotype (Zhang et al., 2012). Fourth, human endocrine systems are inadequate without

food and environmental inputs and connections for which phytoestrogens are a good example (Wilcox et al., 1990). We are part of our ecosystem(s). Fifth, our very presence and gait activates soil microorganisms beneath our feet by bio-communication; these microorganisms network our presence to distant sites – the nature of our ecology still largely escapes us, even though it disappears in dust clouds of ‘development’ (Witzany, 2010).

The rate of biodiverse ecosystem loss is rising rapidly, and with this loss we lose ourselves, since these systems are part of us. Our future health depends on how well we manage our ecology.

## Aspirations

When we were health care professional students, we lived in a time of war in Indochina, of student revolt, of reformist folk songs, of protest against racism and much grievance over the establishment. Then things went relatively quiet (notably on university campuses) and prosperous in the developed world, while billions went hungry and remained poor in the rest of the world, and also at home in the developed world, too.

Now, we face much greater crises of human and planetary security. My grandchildren will most probably have no choice but to eat a more parlous and less safe diet, even if advances in agricultural and food technology make the progress we expect. The well resourced will still be more likely to survive, even as natural disasters increase with climate change. We vaguely knew it could happen, some of us more clearly than others. Time has since been lost.

So, what can we do? Identification with our locale, its food, health and cognate systems should help us to act locally while we think and advocate globally. It is not too late! By 2050, the world’s population should be in decline and the planet may begin to recover. Along mountain trails inaccessible for months in Taiwan, after the devastating Morakot typhoon of August 2009, plants and animals rarely seen began to reappear in the absence of humans. It is sobering to realise that not all of the world’s ecosystems are in need of our ‘species’ for their management! They can and do, indeed, take care of themselves!

Tony McMichael was all of a problem identifier, risk assessor and solution seeker in the quest for favourable and sustainable health ecology, beginning from intense engagement in student affairs and thereafter ever more global (McMichael, 1972; McMichael, 2012; Liverani et al., 2013; The Conversation 2014).

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