

## Episode 8: Liveable Cities

Hello I'm Barry Clarke from Radio Australia and welcome to 'Smart Societies'. In this program we look at 'Liveable Cities'.

**JIM SOORLEY:** The 21st century is becoming once again the story of cities. To understand Thailand you need to understand Bangkok, to understand Taiwan you need to understand Taipei, to understand the United States you need to understand New York and Los Angeles.

**CLARKE:** Former Lord May of Brisbane, Jim Soorley, opening the Asia Pacific Cities Summit in the Queensland capital in October 2003.

**JIM SOORLEY:** Cities are now again the melting pot for ideas, the driving force behind social, economic, environmental, education, employment and health issues across the globe. We have come together to share and to learn and to dream of our cities. Are they places where the aspiration of human heart can be met? What is the best paradigm for the city of the 21st century in the Asia Pacific?

**CLARKE:** Participants came from many countries in the region and addressed issues ranging from urban sprawl to waste management to greening our cities. One practitioner was Dr Ken Yeang, an architect from Malaysia who for 30 years now has been designing 'green' buildings, even skyscrapers.

**DR KEN YEANG:** Every site exists if you like in an ecosystem, you have to look at it and study it and find out its tropic levels, its biodiversity, groundwater conditions, its soil and so forth. You have to really act like an ecologist and study the ecosystem. Then we have to ascertain to what extent it has to be enclosed because once you enclose a building you need some form of energy to maintain the internal conditions for comfort.

Then next you have to look at how you can shape the building. You have to look at the climate of the locality; you have to look at the sun path, whether it's directly overhead as in the tropics or towards the south as in temperate zone. And then see how we can optimise the orientation and the shaping of the building and the use of facade and the use of natural ventilation, all the passive means to try and create improved comfort conditions without the use of any non-renewable source of energy.

The next is to look at the content of the building, what sort of materials you would use and try and see whether you could project ahead what will happen to the materials at the end of the useful life of the building, whether they could be recycled, they could be reused or if not how you might reintegrate them back into the environment.

**SUE SLAMEN:** This sounds quite amazing when you're building a new building you're already beginning to think about the end of its life as a building and its demolition?

**DR KEN YEANG:** I call this designing from source to source, rather than source to sick. If you design from source to sickness, once you're extracting something away from the environment having created a building then sickness you're throwing it away somewhere. From source to source means you think about how you're going to reintroduce the building and its components and its elements back into the natural environment or retain it in the manmade environment by reusing it.

**CLARKE:** Sue Slamen asked Ken Yeang, how he gets a developer or an investor to think green.

**DR KEN YEANG:** First is to tell him that rather than spending your money on fancy ceilings and gold plated light switches and thick furry carpets, you know if you have a good architect you could use simplest and most basic materials and you can make a place look jolly nice. But if you insist on spending money on features which are just decorative and which are gratuitous then it's extremely difficult to do a green design at the same time.

And then obviously we tell the developer that by having green buildings you have a low energy building, by having a low energy building then the energy consumption of the building would probably be between 20 to 30 per cent less than what you would have otherwise, and therefore the operational costs goes down. And that by having green features sometimes you tend to have a building which requires less mechanical systems to cool it, to heat it, and so you keep the costs low. I believe at the end of the day making buildings green is an ethical issue, you know something because we want to do because we think it's good for our future, it's good for the natural environment, and that's something we inevitably have to do.

**SUE SLAMEN:** Is there a role for governments in creating ecologically sound buildings, green buildings that act as a bit of a benchmark for the property market?

**DR KEN YEANG:** Oh yes, the government has the greatest role because you try and convince people by persuading them to do something so the government can do a great deal to persuade the general public to design and to have green buildings and a green built environment. The second thing the government could do is to give incentives, and so for instance if a developer has green features he could be given tax incentives or he could be given increased plot ratio or he could have greater land coverage or he could have benefits which as against developers who don't comply with those green requirements.

And the third strategy the government could adopt is to have penalties that if the developer you know has water closets that were used more than three litres or four litres per flush then his plans won't be approved. So you can achieve results by either persuasion, by incentives or by penalties, and these are things the governments are in the position to do.

**CLARKE:** Ian Kiernan from Clean up Australia and Clean up the World chaired the 'Greening our Cities' forum at the Brisbane conference. One of Ian's major interests is recycling and waste management, so when he travels to the world's major cities, you won't find him at the usual tourist hot spots.

**IAN KIERNAN:** Well I am a very strange tourist. They say do you want to see the Taj Mahal or the Grand Canyon and I say, any chance we can go to the sewerage works and then to the waste disposal facility, and you get some very strange looks I have to say. But what we've got to realise is that recycling is very important because we have finite resources, so if we can find a new use for waste through recycling, what we're doing is we're turning the waste stream into a resource stream - and that's got to be the way of the future. I would hope for a day when we are not relying on landfill for disposal of waste, that we can recover just about everything that previously would have been waste.

**CLARKE:** Ian's been involved with a number of countries in Asia and is impressed that many cities are now initiating their own clean ups.

**IAN KIERNAN:** I'm seeing huge changes in attitude. When I first went to Taiwan it was really a money-making arena and people really didn't care that much about the environment. That is no longer the case in Taiwa - there is huge commitment to cleaning up the legacy of past behaviour, industrial behaviour, and they are addressing it from the president down, they are addressing it in a very serious way. We are seeing the same thing in mainland China; we're seeing the same thing in other Asian nations.

So it does give me encouragement, and certainly we are seeing more commitment to the environment by ordinary citizens. Every one of us is important, every one of us can make a difference, and all we need to do is take that first step and the rest of the journey gets a lot easier after that first step towards looking after the environment.

**IAN KIERNAN:** It's now my great pleasure to introduce to you Dr Chin-der Ou who is the deputy mayor of Taipei. Dr Ou is an engineer, but he's more than that, he's a local hero in Taipei because with the unfortunate event of the earthquake it was he that was at the centre of things directing the rehabilitation of the city. Join me in welcoming Dr Chin-der Ou.

**DR CHIN-DER OU:** In the past 50 years Taiwan's economic development has transformed Taipei from a medium size provincial city to a large metropolis in the Asian Pacific region. In 1999 the average Taipei resident generated 1.42 kilograms of trash per day, compared to 0.6 kilograms back in the year of 1990. We have a total capacity of garbage generation nearly 4,000 tonnes per day, which is putting a significant burden on the local waste treatment facilities.

**CLARKE:** In the 1990s the Taipei City Council used conventional methods for waste disposal including landfill and incinerators. But clearly these were not sustainable and the city was not exploiting recycling opportunities. So on 1 July 2001, the Taipei council introduced a new system for the collection of household waste that was based on a user pays model.

**DR CHIN-DER OU:** When the mayor himself came out with this idea my immediate response was are you out of your mind? If you want to lose the election that would be the best way to do it. But he said, 'Dr Ou you have to be the one who makes this thing go because you are the engineer'. So under this new payback program the citizens must use special trash bag for their garbage to be accepted by the city owned collectors. However, recyclable items are collected for free to encourage recycling. Under the new payback program there is a direct correlation between the volume of trash generated and the fee collected. This provides a direct economic incentive on the public to generate less trash. It is without doubt one of the most direct manifestation of the polluter pays principles.

**CLARKE:** The new system is a huge success, largely due to the citizens' support. Rubbish has reduced by nearly half and the recycling rate has tripled. Taipei's success in reducing waste and encouraging recycling was formally recognised by the Regional Institute of Environmental Technology, when they presented the city with the 2001 Asia Waste Management Excellence Award.

**DR CHIN-DER OU:** The goal for waste management of Taipei city is none less than total recycling and zero land fill in the future. No one has ever anticipated that the mere change of a trash collection fee system would have such a fundamental impact on Taipei residents' lifestyle and we truly hope that the trash revolution today will lead us to a sustainable eco-city, not just for this generation but generations to come. Thank you very much, thank you.

**CLARKE:** This is Smart Societies on Radio Australia, and this program, Liveable Cities. Keynote speaker at the Cities Forum was physicist turned environmental activist, Dr Vandana Shiva.

**DR VANDANA SHIVA:** Cities are at a watershed, they're at an ecological watershed because they could either continue to be what they've been - triggers of totally non-sustainable development, not just in the city but depleting resources backwards in the entire footprint that is constantly growing for maintaining cities. The non-green cities that have been the model so far have on the one hand become very efficient systems of turning resources into waste, whether it is fresh water being turned into garbage or other materials being turned into the kind of waste that's now being recycled. But water drained round from ecosystem, agriculture converting to non-sustainable systems to support the appetite of large cities ends up not just wasting the resources backstream, but wasted resources create wasted people. And wasted people end up being the environmental refugees who start to move into cities creating the slums, all the other problems. We can see a future in which if even half of India starts to move into our already giant-sized cities, those are going to be totally non-sustainable systems. Those won't be sustainable ecologically, they won't be sustainable politically, they won't be sustainable culturally and socially.

**CLARKE:** As Vandana Shiva points out, urban drift is a real problem associated with rapid development. People seeking employment and better opportunities gravitate to the major cities and this in turn puts even greater pressures on finite resources. Malaysia is addressing this problem by developing satellite cities outside the capital, Kuala Lumpur. Prasit Pongbhasat is the Municipal Administrator in Bangkok. He believes this could be a solution for Thailand too.

**PRASIT PONGBHASAT:** Bangkok is the biggest local authority in the country because we have approximately 10 million inhabitants, but the registered population record only six million but we have also another three million migrants from other countries to find work in Bangkok. So the prime minister is saying that from right now they will choose the other place to build a second Bangkok, I think maybe one hour from Bangkok, it will be the second capital of Thailand.

**CLARKE:** One of the greatest challenges facing all cities is the growth in motor vehicle transport. Bangkok is a classic case in point. So severe is the traffic and related health problems that the Bangkok Municipal Administration (BMA), with some support from the UN Healthy Cities program, is tackling traffic as a number one priority.

**PRASIT PONGBHASAT:** The problems of Bangkok are more complex than the other cities I think in the world, especially for the traffic jam in Bangkok, someone had a bad experience to travel in Bangkok. Sometimes it takes more than two hours in the car in the taxi because sometimes during the rush hour during the morning or in the evening your car cannot move and the traffic light turn two times, and three times, more than 10 minutes and 20 minutes. So a lot of people use motorcycle because it moves rapidly, and while your car cannot move more than 10 kilometres per hour, so it's a very serious problem of Bangkok.

**SUE SLAMEN:** People then turn to motorcycles as you say to try and weave their way through the traffic. Does that create its own problems in terms of fumes and pollution, which has adverse health effects then for the people?

**PRASIT PONGBHASAT:** Yes the traffic problem is related directly to the health of people in Bangkok because the two-stroke motorcycle was imported from Japan, but in Japan is illegal for two-stroke motorcycle.

**CLARKE:** In an effort to relieve traffic congestion and pollution, Thailand has invested heavily in public transport systems including a sky train and an underground rail network. And there are plans to further expand these.

At the Asia Pacific Cities Summit it was said that if you can smell and hear the traffic, it's not working properly. Petrol driven vehicles contribute significantly to urban pollution - both air and noise. Dr Christine Sloane is director of 'FreedomCAR', a co-operative research partnership between the United States government and major automobile manufacturers. As in other parts of the world, they're working to develop a green alternative, which runs on hydrogen fuel cells.

**DR CHRISTINE SLOANE:** Fortunately the race is on in earnest, it's on in earnest by all the major auto makers really around the world, and if we are going to move away from the petrol powered vehicle and the environmental side effects that it has, which include energy security of the petrol source by the way, then hydrogen really is the end term that we want to get to, because it has so many advantages in terms of energy security, the number of different fuels you can use to make the hydrogen, the different native sources of energy, feedstock, but it also gives us the freedom from emissions on a vehicle platform.

So in that regard we have an opportunity for all of these cities around the world, particularly these mega cities that are developing through Asia Pacific, to get the air quality emissions frankly to start moving towards zero per car, and more importantly even when the technology is old the emissions don't get any worse, they stay at zero. That's a very big differential from today's cars, which as you know are very, very clean the day we make them and while they're well maintained and used but have a problem with being a source of emissions, as they get older. That's something then that we have to get away from for the future if we have to make sure that we drive the air quality emissions down towards zero.

**CLARKE:** So what will this hydrogen powered car look like?

**DR CHRISTINE SLOANE:** Some of them look just like any other vehicle; in fact they are any other vehicle. Some of those that we have driving around are just based on the sophera (?) platform and we just pull the engine out and repackage the power systems. So to a driver it doesn't look or feel any different than a conventional vehicle.

Now there are some more advanced designs and they take advantage of the fact that it's a fuel cell-powered vehicle and what that means is you don't really need to have an engine compartment up front in these vehicles, in fact we've redesigned some of these so that we just drop them all into the floor. It's like you know the skateboards that kids ride around on. We've just packed the engine right into the skateboard and all the power controls because it's all just electrical and that frees up the whole body above the wheel line to not have engine compartments or anything of the kind.

**CLARKE:** Already, hydrogen powered vehicles are operating in Europe, America and Japan on an experimental basis.

**DR CHRISTINE SLOANE:** And indeed we're looking at building up fuel cell vehicles in demonstrations, you know limited numbers in a number of target cities, and by that I mean cities where we have put in some hydrogen refueling capabilities so that those vehicles can move around with some convenience. General Motors has fuel cell vehicle and Fed Ex delivery service in Tokyo

and we have other vehicles that are slated to start coming into that kind of service in the States. So you know Australia could be on the list and be coming up for that kind of activity as well.

**SUE SLAMEN:** Now you mentioned buses, I think the idea of a cleaner alternative to petrol driven or diesel buses will gladden the hearts of people in Sydney and many other cities that rely largely on buses for public transport. Can the hydrogen cell technology do you think work well for public transport then?

**DR CHRISTINE SLOANE:** Oh sure, it's just a matter of developing it up to those power sizes and making it as affordable as we need to make it so it'll be competitive with the other choices that bus companies have. And then of course those buses drive a lot of miles a day, more than you and I do, most of us anyway, and so we'll have to make sure the technology is really doable so that it can take that kind of service. And that's something that people are just working towards with full expectation that buses are a natural because of the fact that they're in cities and so the attributes that you don't have any emissions is, you know that's important in the middle of cities where there's so many people. And also fuel cell buses are extremely quiet, and so cutting down sort of background noise in cities remains a nice attribute as well.

**CLARKE:** And as Christine Sloane points out, there are more advantages to the hydrogen-powered vehicles than being quiet and pollution free.

**DR CHRISTINE SLOANE:** I think our vehicles are going to interact more with other forms of our being. I noticed that in Adelaide here where I'm visiting there was a statement on the radio yesterday that there was a lot of power outages, it must have been some winds or whatever that took the lines down. And I thought oh boy when the fuel cell vehicles are here you could plug your house into your car, you know this won't be a problem, you could run your house easily from your car if the grid power is down. And that kind of interplay is going to save the house, the vehicle, all these forms of energy need to be intelligently managed not as independent systems but as a collective, optimised, organised use of energy. And I think we're all going to move toward that and I think there's a lot of smartness that goes with that.

**BHOPAL ARCHIVES:** Next to the city of tragedy, Bhopal in central India. Doctors now believe the leak of poisonous gas has killed more than 2,500 people. The number of people affected, many of them blinded, is well over 200,000.

**CLARKE:** December 1984 and the industrial accident in the Indian city of Bhopal causes death and destruction on a huge scale. A lot of manufacturing and industrial processes that take place in many cities require the storage and use of highly toxic and volatile chemicals. Green chemistry is the new approach to using chemicals. The principles of green chemistry are to be hazard free, waste free, energy efficient and non-toxic.

Emeritus Professor Sharma from the Mumbai University Institute of Chemical Technology has worked closely with Indian industry. He says green chemistry is all about recycling, which not only makes good environmental sense but good economic sense too.

**PROFESSOR SHARMA:** Anything which goes down the drain is money going down the drain quite independent of its bad impact. So it pays to come out with cleaner and greener processes, even purely from economic consideration point of view, and we have been able to show a good number of examples in India, much more remains to be done....

We have made many chemicals where the old polluting processes have been replaced by green processes. For example because we need urea in very large quantities we do not want any waste stream of water to go from urea plants which have not been treated thoroughly and that water cannot be recycled. Water is going to be an acute problem in India and I dare say for the whole world. Therefore recycle of water will become very important, and we're already using membrane separation industry in the farmers particularly industry. India is striving very hard, it has been an integral part of chemical industry from the beginning, and now that focus is there not only in cleaner, greener, it must be absolutely safer.

**JANET SCOTT:** Anything we do is never enough, but we like to believe that we're doing the best that we can. The kind of institute that I work in, the Centre for Green Chemistry, which is funded by the Australian Research Council, is there to do fundamental research, to begin to provide the tools that might provide for greener chemicals and greener chemical production.

**CLARKE:** Janet Scott is the deputy director of the centre at Monash University.

**JANET SCOTT:** One of the ways of avoiding having to have something that's dangerous in store is to develop a process that doesn't use it. But given that a lot of the re-agents that we like to use because they're very efficient - they react and produce very clean products - are volatile and because they're very reactive are also reactive in the human body and so are dangerous to humans, we might want to try and develop ways where we can handle those materials far more safely.

Of course there are lots of engineering controls one can put in place, but there are also ways of doing those chemically, and some examples are ways to contain very volatile materials in things like inclusion complexes or the formation of bonds that are relatively easy to break. And I think the example I gave earlier was the formation of a product that is effectively a salt by reaction with carbon dioxide in a secondary amine. That provides you with a product called a carbonate, which can be very easily decomposed into its starting materials, but as the carbonate, at least as sodium salt is handled as a liquid. So you measure it out as a liquid, you pour it into your reaction vessel and then you heat it gently releasing the two components. That kind of innovation is the sort of thing that I'd like us to see doing a little more of - using the kinds of chemical brain that we have rather than necessarily chemical or engineering brawn.

**CLARKE:** Janet Scott. The next program in our series is Good Corporate Citizens.

**ANANT NADKARNI:** Instead of giving back out of a profit that is made we try to see how these costs can be estimated in advance and built into the cost structure like any other cost. So what you create as profit is green profit, and I'm not just talking about social expenditure for sundry charity here and there. I'm also talking about capital regeneration so that your equipment and facilities are environmentally friendly, where there's a lot of money going every year, all this is internalised as development cost.

**CLARKE:** Anant Nadkarni from the Tata Group in India.

This program was produced by Sue Slamen and Barry Clarke from Radio Australia.