

Sustainability

SLIDE 1
Question

Welcome to the session. Today, Geoff West, Leanne Parker and I will discuss sustainability. I'll start by putting a question to you. **“What are you doing to manage your resources?”**

Sustainability has a broad definition and relates to virtually every part of our lives. In fact with the number of different interpretations available, I think that the number of definitions for the word itself is unsustainable. So, for our resource based industry, I thought I'd put some context around it.

Let's go back a little, then.

While the human species diverged from apes millions of years ago, it was not until about 60,000 years ago that modern society appeared; bringing with it much of what we identify with today, to define ourselves as opposed to 'animals'. One of the key advances at the time was the use of stone for tools. Quarrying had commenced.

Through the ages since, mankind has extracted resources from the environment around him to provide the necessities for survival and to advance his way of life. As a starting point, the essential resource base includes food, water, energy and infrastructure materials. In today's global society, some would argue that essentials should also include communications, and transportation or logistics, but as a resource, these two are underpinned by materials and energy, thus we return to the original four identified throughout history.

The lifestyle of a society is dependent on the resources it has available, and accordingly, a cessation of access to suitable resources will result in the collapse of the previous lifestyle. This is particularly the case for the access to food supply and shelter materials. It is difficult to gauge the rate at which biological resources can be harvested indefinitely without depleting them. Where there are insufficient resources to support the population, then that population reduces as people move or die out; and when people move – then cities move or die.

As obvious as this may seem, history indicates that we humans have a very poor record of managing their resources in a sustainable way. There are multiple examples of civilisations that have collapsed or been abandoned as a result of ruined resource bases.

SLIDE 2
Chaco
canyon

One of these is in North America, where the 'Anasazi' developed the most advanced Indian civilisation on the continent, lasting from 900AD until the 12 century. They constructed massive multistorey dwellings (called Pueblos) utilising stone and timber. The Chaco Canyon national monument includes one of these that had 650 rooms. It stood 5 storeys high with massive timber floor beams and was 205m long x 96m wide. The structure is located in the middle of the desert and was the largest building ever erected in North America until the late 19th century when it was topped by steel skyscrapers.

How was it built and why was it abandoned?

Originally the location was surrounded by woodland. As the Anasazi civilisation developed, they consumed the surrounding forest for construction materials and energy sources. With the depletion of their resources, access to energy sources extended out to 16km and roads were built to bring construction materials from 40 km away and then further out from 80km away. Remember, they had no beasts of burden so logistics consisted of manpower. When the food production finally failed, the city was abandoned.

In the Eurasian continent, history shows the centre of power shifted geographically from the Mideast (Assyria, Babylon, Persia) to ancient Greece, through Rome and further to western and northern Europe. A plausible hypothesis for this shift is as a result of each of the ancient civilisations ruining their underpinning resource bases progressively.

Moving forward then, the population of the world today is approximately 6 billion with an expected figure of 9 billion people by the year 2050. In our existing cities, the demand for resources will outstrip supply as the number of people inhabiting these continues to swell. City residents will climb from 3 billion to an estimated 6 billion people in the same period, we are looking at a future where two thirds of the world's population will live in cities. This increasing population requires increased quantities of resources and more efficient use of those resources. Interestingly, 2008 was the year when city dwellers exceeded 50% of the world's population.

SLIDE 3
66%

5 min

(Moreover, the world's city dwellers over the last century went from 250 **M**illion to 2.8 **B**illion people).

SLIDE 4
Definition

Clearly then, cities themselves, as the largest focus for consumption, need to be sustainable too. That is, using the UN Bruntland Commission definition, they must be able to *"... meet the needs of the present without compromising the ability of the future generations to meet their own needs"*.

Residents of cities use far less resources per capita than those in suburban or rural areas. When the size of a city doubles, its material infrastructure does not. A city of 8 million people typically needs 15% less of the same materials and infrastructure as do two cities of 4 million people. On average, the bigger the city, the more efficient its use of infrastructure; leading to savings in resources and materials as well as energy. This holds true across nations with very different levels of development, technology and wealth.

So; there are environmental benefits in reducing the geographical footprint for living and working. My observation is, when Australia requires an additional power-line or more houses, new ones are placed beside the existing ones (welcome to the land of sweeping plains). A similar observation in Japan shows that when they require additional infrastructure, the new one is placed on top of the existing. Going vertical results in more land being available for alternative use; including resource access where the land is suitable.

SLIDE 5
Sky-
scrapers

Clearly, this is already in play, with the trend for vertical construction accelerating.

The last decade has been the single greatest period of skyscraper construction in history with over 97 due for completion in 2011 alone. China is leading the boom where the capacity of their cities will increase by 350 million people by the year 2025. For the quarrying industry, vertical construction and condensed high usage infrastructure means an increased need for our heavy construction materials (Great news!).

SLIDE 6
EAA
graph

No country has ever sustained economic growth without urbanisation. Data also shows that there is a direct correlation between GDP and the consumption of quarry materials.

As managers of one of the key resources underpinning our society's lifestyle, the extractive industry has a great responsibility to protect and maximise the resources

for the best benefit of our current and future communities. This includes the extraction yield, efficient use of end-products, and secure reserves; all with a minimised impact on the surrounding environment.

As in the example set by the Anasazi, when resources were consumed, they were sourced from further and further away, but the demand and subsequent value placed on the products exceeded the cost and logistical difficulties in accessing resources. Likewise, recognising the value of close proximity stone reserves, and other sources of construction materials, is equally important and there is no doubt that a resource found closer to the city would have been both highly desired and protected, had the difficulties of proximity been realised prior to this.

Of course as cities become more densely populated, they also become more difficult to abandon. There is an increasing reliance on resources and hence a broader range is required to source them. For this, logistics plays an increasingly important role. As you can see, history repeats itself.

In today's world, the logistics are mostly mechanised, depending on the country, and this in part allows for the extended range required. Long-term resource management, and more recent environmental thinking, both highlight the need to be more efficient in our utilisation of our energy resources. With the high density and relatively low value products yielded for construction materials, the moving of large quantities becomes a high energy exercise. This weighs heavily against the sourcing of construction materials from afar, but ultimately it becomes an economic exercise. This does not dispute the need for efficient energy utilisation; however – HOW that exercise is managed is an excellent topic for others to discuss.

10 min

We have the opportunity and knowledge to be one of the first generations to sustainably manage our resources. Should we fail, we may be one of the last of our era to be unsuccessful.

So – coming back to the facts:

1. History says society relies on resources.
2. Forecasting says mankind will need more and more resources.
3. Quarry products are an essential resource.
4. Logically then, quarries are needed for the protection of civilization as we know it!

But does the government know? Do the PEOPLE know?

Unfortunately; for the quarry industry to be sustainable, it also needs the support of those people.

So the extractive industry and our society have a symbiotic relationship, only it appears that one or both parties are in denial.

What are they missing? What are we missing? Why isn't the extractive industry associated with the infrastructure it provides for? Just as milk comes from cartons – so too, do roads come from trucks and high-rise buildings come from cranes.

SLIDE 7
EAA
graph

In Australia, statistics show that each person uses, on average, about seven tonnes of aggregates per year compared with an average of two tonnes of food consumed in the same period. Communities value their buildings and roads but for the greater part disassociate the quarry industry, perceiving it as a 'hole in the environment with trucks coming out of it'. Further, quarries could be located anywhere – rock is just rock after all. Just ask anyone (who doesn't know)!

Recently in Europe, the European Aggregate Association has commenced discussions with the European Union government to address a growing shortfall in construction material reserves across the continent. Available resources are being reduced annually, with conflicting land-use sterilising far more reserves than consumption takes. Presenting an obvious case, they have been met with a positive response.

For Australia, we have a similar structure to negotiate, with the state government controlling the approval processes but no national consistency. The protection of reserves located within close proximity to major cities should be addressed nationally. However this is a first step – the planning. The actions must next pull through to the state governments, and then be enacted at a local level to be effective. This will assist in securing reserves, but as seen in the Southern Highlands of NSW and elsewhere in the country, the approval of reserves doesn't secure the cooperation of the local community which subsequently impacts on a quarry's ability to operate.

SLIDE 8
eyes

Therein lies the heart of 'Public Perception'. It is a broad issue that must be managed at a local level in my view. For the industry / community interface, 'Perception is Everything'. It is built up of individual issues that are raised locally and

when combined, present as the community experience. There are multiple messages and multiple communication mediums that work both for and against our industry as Geoff and Leanne will expand on.

I take the opportunity to ask – **What have you done to contribute to the perception held of your operation?**

In parallel to gaining a supportive society, there are a number of key operational areas that need to be addressed for a sustainable construction material resource base. In addition to securing sufficient supply to meet demand, there is the production of appropriate products for the applications and the effective management of the logistics from reserve to final placement.

As I indicated earlier, *‘In existing cities, demand for resources will outstrip supply as the number of people inhabiting cities grows from 3 billion to 6 billion over the next 40 years’*. With this in mind, we can’t continue to do the same thing. We need a different outcome. How do we gain additional resources?

Competing uses for land reduce the availability of resources and reserves. With limited availability of suitable geology the imposition of conflicting land-use becomes unsustainable, leading to the question : **What land-use is the real priority?**

15 min

It is said that “Necessity is the mother of Invention”. However, it may be more appropriate to say “Invention is the mother of Necessity”. Flexibility in thinking, is critical to creative and clever solutions. When added to knowledge, good communications and the desire to fulfil our responsibilities, challenges can be overcome. In support of this, most of the physical stuff in cities was built by everyday people as a collective effort, rather than one-off design and construct. The most effective solutions have been based on actual need or application not on assumptions and that’s why they are resilient to change.

Clearly, the recycling of resources is necessary to meet our responsibilities as stewards for scarce resources. The obvious one is the reuse of construction material waste from demolition, but what about moving competing land-uses onto landfill to free up access to reserves? Lagos in Nigeria is an example where compacted garbage is covered with silt for the reclamation of working and urban land areas. While this community development is unsanctioned, why isn’t this option more fully pursued?

What about the use of mounting waste materials from mining and power generation. How can previously developed technologies be employed in new applications? How can these be harnessed to supplement our resources?

In the future, will an increasing need for the waste products like ash, ultimately drive the type of power generation utilised?

But securing the quantities is only part of the equation with access and proximity just as critical. Sustainability requires a solution – how to meet today’s needs as well as provide for the future requirements. Our job is to do this in the most effective and efficient manner, maximising the available stock for future generations.

Over the course of history, mankind has managed to repeatedly fail in the sustainable management of the resources available to him. While it could be argued that previous civilisations and those who came before were irresponsible, and failed in their obligations to their future generations, this would be unfair. The key to effective management is around what is known (or should have been known) about the resources, and the implications of the choices made. Poor knowledge of previous failures could be used as an excuse for past outcomes, but that ‘luxury’ is no longer viable. All of us here are responsible for the future NOW.

SLIDE 9
IoQ
crest

Interestingly, the Armorial Bearings of the Institute of Quarrying bear the Latin motto:

“Terram Autem Filiis Hominum“

which reads:

“the earth hath He (God) given to the children of men”

Latin scholars advise that a more meaningful translation is:

“The fruits of the earth for the children of men”

The Motto reminds quarry operators of their responsibilities to preserve and optimise the usage of the land, and the need to protect the environment surrounding the land. The Institute's Coat of Arms was designed at the College of Arms in London and granted in 1958. **That was over 50 years ago** and it is more relevant now than ever.

SLIDE 10

Slide

Q 1

Q 2

Q 3

Q 4

So; with the information that is available to us today;

- **What will you do to fill your knowledge gap?**
- **What will you do to fill the community's knowledge gap?**
- **What will you do to address the community's perception?**
- **What will you do to manage your resources?**

Thank you.

20 min

References

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