# Case Study: Calculating the Ecological Footprint of the 2004 Australian Association for Environmental Education (AAEE) Biennial Conference

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**Abstract** Event tourism is accompanied by social, economic and environmental benefits and costs. The assessment of this form of tourism has however largely focused on the social and economic perspectives, while environmental assessments have been bound to a destination-based approach. The application of the Ecological Footprint methodology allows for these environmental assessment boundaries to be extended. This case study applies the footprint methodology to the Australian Association for Environmental Education (AAEE) Biennial Conference held in Adelaide in 2004. The results of the case study provide important insight into the planning and delivery of future events for the Association and event managers.

## Introduction

The term Ecological Footprint is widely and broadly used within the environmental arena to refer to the environmental impacts of human activities. It is also, however, a defined and rigorous methodology with the aim of calculating the required biological capacity to supply consumption demands and sinks for pollution outputs. Since its early application by Wackernagel and Rees (1996) the method has been applied to several kinds of activities, such as (Barrett, 2003; Gössling et al., 2002; Høyer & Holden, 2003; Muniz & Galindo, 2005).

A common application of the Ecological Footprint is to assess the footprint of nations and populations. Today, Ecological Footprint ratings exist for most nations around the globe (WWF et al., 2004), which makes for interesting comparisons between the economies of the Earth's citizens. The results, however, look increasingly bleak with footprint estimates indicating that human society is consuming the Earth's resources faster than they can be regenerated.

The footprint calculation methodology can be applied on an activity basis or, as in the case of this article, to 'single events'. This paper explores the use of the footprint methodology and its application to a conference held in Adelaide, South Australia in 2004. The case study results have been obtained by collecting data from the 2004 Biennial Conference of the Australian Association for Environmental Education (AAEE) which was entered into the Victorian Environmental Protection Agency 'Events and

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Conferences' Ecological Footprint calculator[1]. The case study also explores a number of alternatives that could be used to reduce the footprint of subsequent conferences.

## Footprint of Events

Economic, social and environmental assessment of events is found predominantly within tourism-based literature. Assessing the costs and benefits of 'Professional Events' held by universities, research institutes and consultancies is questioned by Høyer and Næss (2001). In their assessment of events, i.e. conferences, congresses, symposiums, seminars, trade shows and forums, they provide a sceptical account of the benefits obtained, due to their subsequent environmental impacts.

The present scale of event tourism is most certainly unprecedented and closely tied to the globalisation of the world economy and the accessibility of travel services. The scale of such events varies widely, from small locally based gatherings to large international events such as the 2002 Johannesburg World Summit on Sustainability that was attended by over 60,000 delegates from over 180 nations (Vidal, 2002).

The economic benefits of events are significant within the Australian economy. The "National business events study" (Deery et al., 2005) estimates that in 2003, 316,000 business events were held with a total of 22.8 million event participants. The total expenditure as a consequence of these events exceeded 17 billion dollars and contributed 214,000 jobs.

Such events possess both benefits and costs that have been the subject of debate in many academic reviews. The main focus of these analyses, however, has been towards social and economic evaluation (Burgan & Mules, 2001; Cohen, 1993; Garcia-Ramon, 2000; Getz, 1991; Horne, 2000; McIntosh et al., 1995; O'Sullivan & Jackson, 2002; Smith & Jenner, 1998), with little consideration given to quantitative assessments of their ecological impacts. The demand event tourism imposes on natural resources is the primary motivation for the following analysis and forms the boundaries of the associated research.

This research has been built on the framework developed by Wackernagel and Rees (1996) using the six major components of biological productive land or space: arable, built-up, forest, energy, pasture and sea (Wackernagel & Rees, 1996). In order to account for a percentage of land for biodiversity, which is considered essential for human survival, Biodiversity Land has also been included. Figure 1 provides further explanation of the land categories used throughout the calculation method.

**"Energy land":** The biologically productive area required to sequester enough $CO_2$ to avoid an increase in atmospheric $CO_2$ concentration.

**Built-up land:** The land area occupied by infrastructure for housing, transportation, industrial production and capturing hydroelectric power.

**Cropland:** The land area used for growing crops for food, animal feed, fibre and oil.

**Grazing land:** Grassland and pasture area used for grazing animals raised for meat, hides, wool and milk production.

**Forest area:** Natural or plantation forests used for harvesting trees for timber and paper/making, and gathering fuelwood.

**Fishing ground:** Productive fishing ground for fishing and other marine resources.

**Biodiversity land:** The land area set aside for biodiversity. This has been set at 12% of the Earth's land area (WCED, 1987).

FIGURE 1: Area Types of the Ecological Footprint and Biocapacity Accounts

## Methodology

The EPA Victoria Ecological Footprint Event Calculator[2] referred to earlier was used to estimate the Ecological Footprint of the AAEE 2004 conference. The Event Calculator provides event managers with an opportunity to enter data on their key business functions and obtain instant feedback on the environmental footprint of their event. The calculator was designed by EPA Victoria in partnership with the Centre for Design at the Royal Melbourne Institute of Technology and the National Centre for Sustainability at Swinburne University.

The Ecological Footprint is calculated by summing the biocapacity (land areas) required to supply all of the goods and services and to absorb waste outputs. Methodological explanations for calculating the Ecological Footprint are outside the reaches of this paper; however, for detailed information on the calculation process for the National Footprint Accounts see Wackernagel et al. (2005). For the application of the footprint methodology within the tourism sector refer to Hunter (2002) and Gössling et al. (2002). The Event Calculator assesses the Ecological Footprint of activities associated with the operation of events. Data entered into the calculator are processed with instant feedback given to the user. The data linked to the calculation procedures include economic input / output data and process analysis (Life Cycle Analysis) data (Lenzen & Murray, 2001). The data fields of the Event Calculator include:

*Office & Administration*

Accounts for management and organisation impacts of the event.

*Event Details*

Fields require information such as the duration of the event and the number of participants.

*Event Venue*

Fields require information obtained from the venue operator. Information includes area and structure of building, energy supply and consumption.

*Food and Fibre*

Financial expenditure data on a range of food and other consumption items.

*Waste and Recycling*

Includes fields that estimate the total volume and varying disposal scenarios of generated waste.

*Transport*

Two transport fields calculate the total footprint of travel to the destination and travel at the destination.

*Accommodation*

The total number of bed nights occupied in a range of accommodation options e.g. luxury → camping.

Data for entry into the Event Calculator was obtained through the use of questionnaires. Specific data were required for the event management, event host and event participants. Questionnaire proformas used to obtain specific event data are provided within the Event Calculator. The questionnaires were distributed via email to the venue managers and given to conference participants through the registration process. Data obtained from the questionnaires were collated using an Excel spreadsheet and then inserted into the Event Calculator. This task was undertaken to assign a percentage of the organisation footprint to the specific event being assessed. This was based on venue use.

## Results

Using the Event Calculator, the results are communicated in a number of ways. Footprint results are communicated in global hectares (gha), which are present on the right hand column of the data entry, or 'Questionnaire' sheet, once the data have been entered into the left hand cells (Figure 2). Global hectares are defined as actual hectares that have been translated into 'biologically productive space with world average productivity' (Global Footprint Network, 2005).

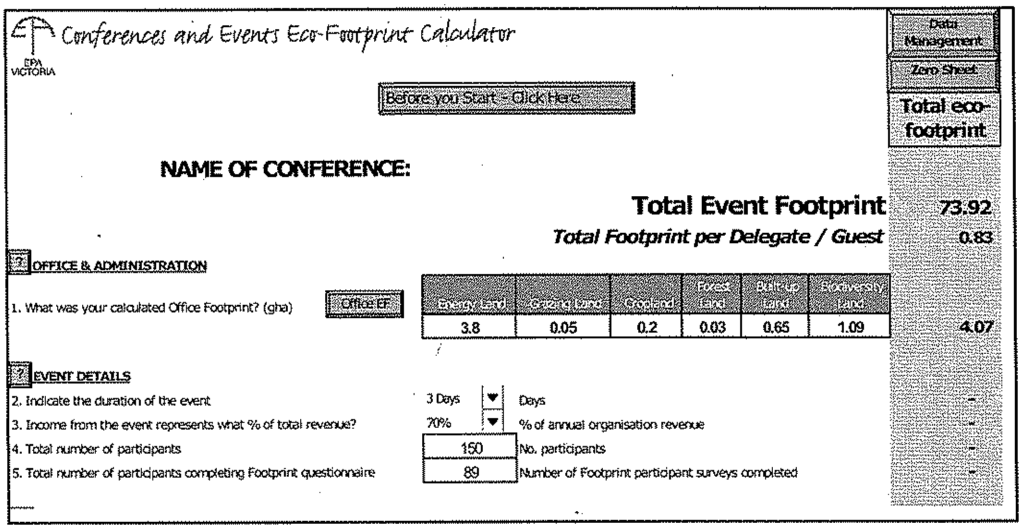



FIGURE 2: Ecological Footprint Event Calculator

The following figures and tables illustrate the results by impact activity (the data entry categories) of the data collected from the AAEE 2004 Biennial Conference.

### *Office & Administration*

The results in Table 1 represent the estimated organisational footprint of the conference management committee. Results assigned to the footprint of the AAEE conference represent 70% of the total footprint of the event organisers, the South Australian chapter of AAEE[3]. This percentage was obtained through estimating the percentage of work-time associated with conference organisation and management. This estimation was based on estimates provided by the AAEE organising committee.

TABLE 1: Footprint of office and administration (gha)

| Energy Land | Grazing Land | Cropland | Forest Land | Built-up Land | Biodiversity Land |
|---|---|---|---|---|---|
| 3.8 | 0.05 | 0.2 | 0.03 | 0.65 | 1.09 |

### *Event Details*

The details illustrated in Figure 3 feed data assumptions into the other aspects of the footprint assessment. This includes allowing for the footprints of people who did not fill out footprint questionnaires, allocating an administration footprint and allocating the associated footprint of the venue and accommodation.

| | | |
|---|---|---|
| 2. Indicate the duration of the event | 3 Days | Days |
| 3. Income from the event represents what % of total revenue? | 70% | % of annual organisation revenue |
| 4. Total number of participants | 150 | No. participants |
| 5. Total number of participants completing Footprint questionnaire | 89 | Number of Footprint participant surveys completed |

FIGURE 3: Event details

### *Event Venue*

The footprint results illustrated in Figure 4 are negligible to the overall footprint of the conference. This is due to the inputs being for the venue for one year, whereas this event occupied the venue only for a few days (only a fraction of annual input), therefore the resulting impact is very small. The results appear to equal zero for most categories due to the rounding down to two decimal places.

| | | | |
|---|---|---|---|
| 6. How much electricity does the venue use per year? | 6500 | kWh (kilowatt hours) | 0.00 |
| 7. What percentage is supplied by green power? | 0% | | |
| 8. How much natural gas does the venue use per year? | 0 | MJ (Megajoules | – |
| 9. How much water does the venue use per year? | 700 | Megalitres per year | 0.12 |
| 10. Enter the ground area occupied by the venue | 2000 | Square Metres | – |
| 11. What is the area of associated driveways, garden etc? | 5000 | Square Metres | 0.00 |
| 12. Enter the total number of floors of the venue | 3 | | – |
| 13. Enter the total used floor area of the venue | 1500 | Square Metres | 0.00 |
| 14. What is the expected life of the building in years? | 100 | Years | 0.00 |

FIGURE 4: Footprint contribution of event venue

### *Food and Fibre*

The largest contributors to the footprint of food and fibre include expenditure on restaurants, meat and meat products and paper-based products. Of these, meat and meat products contribute the largest footprint per dollar of expenditure. The large footprint associated with paper-based products is due to marketing and promotional information, while restaurant expenditure was due to functions such as the conference dinner. Food accounts were disaggregated through reviewing purchase receipts and estimating the percentage of expenditure of menus and invoices supplied by caterers.

(see next page for Figure 5: Footprint of food and fibre)

| 15. Enter expenditure for the following items: | | | | |
|---|---|---|---|---|
| ITEM | | | | |
| *Meat and meat products* | $ 849.00 | $ Dollars | | 1.68 |
| *Dairy products* | $ 585.35 | $ Dollars | | 0.18 |
| *Fruit and vegetable products* | $ 3,271.10 | $ Dollars | | 1.08 |
| *Oils and fats* | $ 85.25 | $ Dollars | | 0.10 |
| *Flour mill products and cereal foods* | $ - | $ Dollars | | - |
| *Bakery products* | $ 508.50 | $ Dollars | | 0.20 |
| *Confectionery* | $ - | $ Dollars | | - |
| *Other food products* | $ 914.00 | $ Dollars | | 0.76 |
| *Soft drinks, cordials and syrups* | $ 12.00 | $ Dollars | | 0.00 |
| *Beer and malt* | $ 48.00 | $ Dollars | | 0.04 |
| *Wine and spirits* | $ 1,248.00 | $ Dollars | | 0.30 |
| *Tobacco products* | $ - | $ Dollars | | - |
| *Textile products* | $ - | $ Dollars | | - |
| *Clothing* | $ 848.00 | $ Dollars | | 0.23 |
| *Footwear* | $ - | $ Dollars | | - |
| *Tea and coffee* | $ 849.80 | $ Dollars | | 0.10 |
| *Paper containers and products* | $ 3,824.00 | $ Dollars | Recycled Content | 1.49 |
| *Restaurant* | $ 3,036.00 | $ Dollars | | 1.85 |
| *Stationary* | $ 98.00 | $ Dollars | | 0.04 |
| ***Total*** | **$ 16,177.00** | $ Dollars | | |

FIGURE 5: Footprint of food and fibre

## *Waste and Recycling*

Waste collected at the conference was separated into: waste to be recycled; organic waste for composting; and waste going to landfill. Due to the small amount of waste generated and the limited potential for savings, the total footprint reduction achieved was minimal. Elements of the waste stream are not captured by the calculators, such as waste generated by suppliers, e.g. the event venue and event caterers. The footprint savings achieved by the conference are illustrated in Figure 6.

| 16. Enter the amount of waste recorded at the event. | | | | | |
|---|---|---|---|---|---|
| *Paper to be recycled* | | Size of bin (lt) | 0 | No. Bins | - |
| *Glass to be recycled* | | Size of bin (lt) | 0 | No. Bins | - |
| *Plastic to be recycled* | | Size of bin (lt) | 0 | No. Bins | - |
| *Aluminium and steel to be recycled* | | Size of bin (lt) | 0 | No. Bins | - |
| *Glass and plastic to be recycled* | | Size of bin (lt) | 0 | No. Bins | - |
| *Paper, glass, aluminium and plastic to be recycled* | 120 | Size of bin (lt) | 9 | No. Bins | - 0.02 |
| *Food Composted* | 120 | Size of bin (lt) | 6 | No. Bins | - 0.00 |
| *Waste to landfill* | 120 | Size of bin (lt) | 1 | No. Bins | 0.00 |

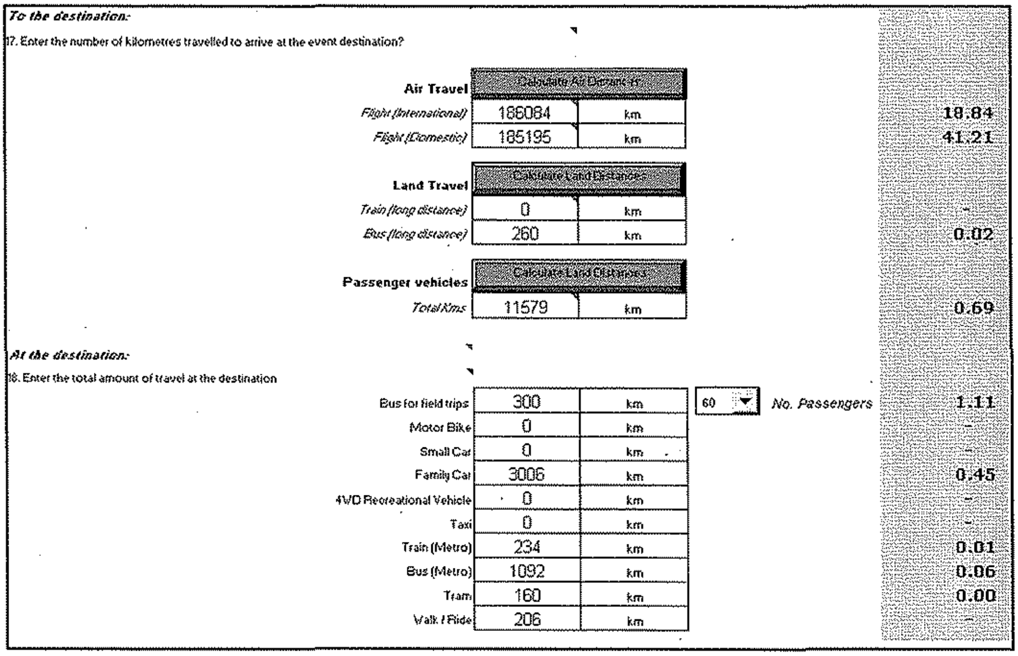
FIGURE 6: Footprint of waste and recycling

## *Transport*

The total footprint of the AAEE conference is clearly dominated by transport to and from the event. Due to the 'national' nature of the conference, the geographic dispersal of Australian settlements and the attendance of international speakers, the footprint attributed to air passenger kilometres dominates the footprint calculations.

The impact of fuel consumption by passenger vehicles is illustrated clearly with the total number of car kilometres travelled to the destination being assigned to small vehicles, while transport at the destination was assigned to a family-sized vehicle. This assumption was made due to a lack of data indicating vehicle type.

The total number of kilometres travelled by bus for field trips at the destination is significantly less than the total number of kilometres travelled, but results in a much higher footprint due to the calculation methodology. The calculation method for field trips is based on passenger kilometres rather than net kilometres. In this scenario 18,000 passenger kilometres have been travelled.



*To the destination:*

17. Enter the number of kilometres travelled to arrive at the event destination?

| | | | |
|---|---|---|---|
| **Air Travel** | Calculate Air Distances | | |
| *Flight (International)* | 186084 | km | 18.84 |
| *Flight (Domestic)* | 185195 | km | 41.21 |
| **Land Travel** | Calculate Land Distances | | |
| *Train (long distance)* | 0 | km | - |
| *Bus (long distance)* | 260 | km | 0.02 |
| **Passenger vehicles** | Calculate Land Distances | | |
| *Total Kms* | 11579 | km | 0.69 |

*At the destination:*

18. Enter the total amount of travel at the destination

| | | | | |
|---|---|---|---|---|
| Bus for field trips | 300 | km | 60 *No. Passengers* | 1.11 |
| Motor Bike | 0 | km | | - |
| Small Car | 0 | km | | - |
| Family Car | 3006 | km | | 0.45 |
| 4WD Recreational Vehicle | 0 | km | | - |
| Taxi | 0 | km | | - |
| Train (Metro) | 234 | km | | 0.01 |
| Bus (Metro) | 1092 | km | | 0.06 |
| Tram | 160 | km | | 0.00 |
| Walk / Ride | 206 | km | | - |

FIGURE 7: Footprint of transport

## *Accommodation*

The rate at which hotels were occupied by event participants results in a very small fraction of the hotel footprint being assigned to the conference. It has been estimated that luxury and five star hotels have a much higher footprint than other accommodation options (Gössling et al., 2002). Participants who visited friends and relatives or stayed at their usual residence are considered to contribute no accommodation footprint to the conference. The results of the accommodation footprint are estimated in Figure 8.

(see next page for Figure 8: Footprint of accommodation)

19. Enter the total number of nights stayed at the following accommodation:

| | | | |
|---|---|---|---|
| Luxury Hotel | 57 | No. bed nights | 0.04 |
| Midscale Hotel | 137 | No. bed nights | 0.01 |
| Economy Hotel / Motel | 125 | No. bed nights | 0.00 |
| Green Hotel | 0 | No. bed nights | - |
| Visiting Friends and Relatives | 130 | No. bed nights | - |
| Camp Ground | 0 | No. bed nights | - |
| Usual Residence | 8 | No. bed nights | - |
| **Total Bed nights** | 457 | | |

FIGURE 8: Footprint of accommodation

### *Graphical Results of the Footprint*

Table 2 illustrates the composition of the total footprint by land type and activity. These results are used to generate the graphs illustrated in Figure 9 and Figure 10. In both figures it is evident that transport dominated the footprint of the AAEE 2004 conference. Figure 10, however, provides further detail demonstrating that the majority of the footprint is unsurprisingly associated with energy land. As mentioned previously, due to rounding the activity areas associated with the venue, waste and accommodation appear to equal zero. The negligible results are illustrated in Table 2.

The footprint of biodiversity has been incorporated into the calculator in order to communicate to users that not all bioproductive land space can be consumed for direct economic productivity. The calculation of biodiversity into the footprint calculator adds 12% on to the total footprint. This figure has been quoted by the World Commission on Environment and Development (1987).

TABLE 2: Footprint by activity and land type

| | Total Ecological Footprint | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Energy** | **Grazing** | **Crop** | **Forest** | **Built-up** | **Biodiversity** | **Total** |
| *Office* | 2.66 | 0.04 | 0.14 | 0.02 | 0.46 | 0.76 | **4.07** |
| *Venue* | 0.07 | 0.00 | 0.00 | 0.00 | 0.05 | 0.02 | **0.13** |
| *Food and Fibre* | 3.81 | 0.86 | 1.37 | 0.18 | 0.81 | 0.96 | **8.00** |
| *Waste and Recycling* | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **-0.02** |
| *Transport* | 47.17 | 0.00 | 0.00 | 0.00 | 7.12 | 7.40 | **61.69** |
| *Accommodation* | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.01 | **0.05** |
| **Totals** | **53.70** | **0.90** | **1.51** | **0.20** | **8.47** | **9.14** | **73.92** |

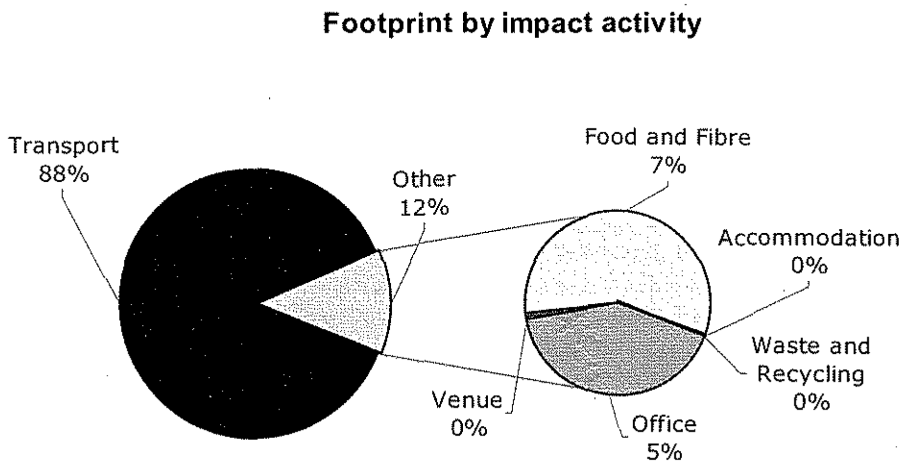



FIGURE 9: Composition of footprint by activity

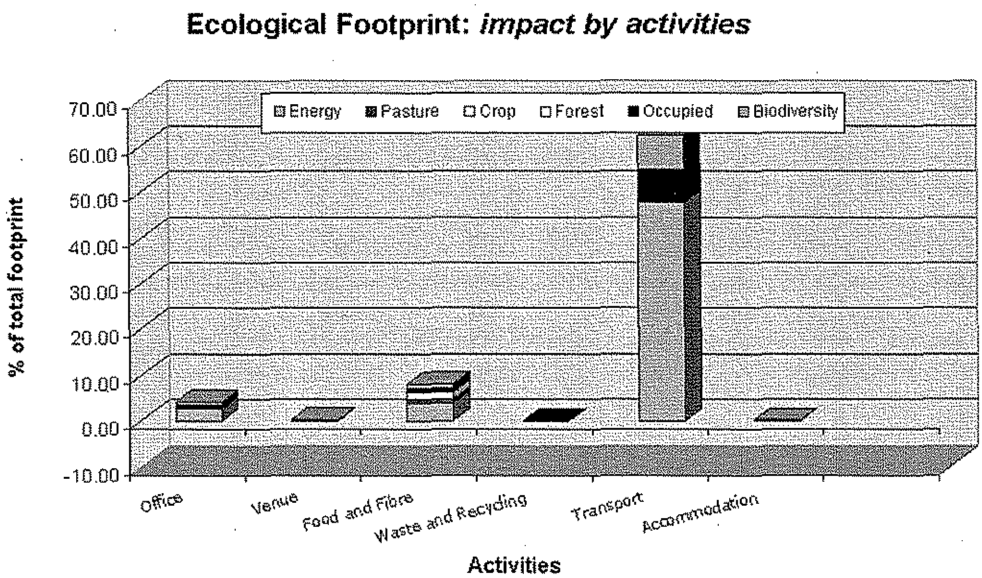



FIGURE 10: Footprint composition by activity and land type

## Discussion

In 1999, calculations by Wackernagel et al. (1999) estimated that global consumption was already exceeding the Earth's biological productivity by around 20%. Estimates at that time allocated 2.2gha per capita / year, which was further reduced to below 2gha/ year when accommodating for biodiversity conservation. The results of this analysis pose serious questions about the manner in which social gatherings are conducted within a globalised economy. Indeed, the per delegate footprint of the delegates (i.e.

75gha/150 delegates = +0.5gha) represents almost a third of their allocated annual consumption.

The key benefit of using Ecological Footprint assessment (EFA) to measure the sustainability of event tourism is that it provides an insight into the resource consumption from a global perspective. Its potential application in the tourism sector is essentially as a tool that can be used to overcome the limitations of destination-centric environmental assessment tools such as Environmental Impact Assessments, the Carrying Capacity Concept and the Limits of Acceptable Change (Collins, 1999; Gössling et al., 2002; Hunter, 2002). The issue of tourism centricity is a major concern of tourism evaluation as it fails to account for consequences outside the host destination. Its application, however, is believed to be accompanied by an increased desire to achieve sustainable practices and an increased understanding of how, and the extent to which, tourism impacts the supply of global natural resources.

The application of EFA within the tourism sector is, however, a complex task with the major obstacle being the establishment of boundaries. This is due to the large number and complexity of inputs flowing through the industry that are provided through numerous suppliers. Assigning values to the event account excluded, for example, the Ecological Footprint of the furnishings and fittings, purchases at the gift shop, and the construction and maintenance of infrastructure to service visitor needs (e.g. computers, printers, telephones etc). The contribution of these inputs is likely to be large and further increase the conference footprint to some degree (Høyer & Næss, 2001). 'Tourist Leisure Space' has also been excluded from this assessment. 'Tourist Leisure Space' was employed by Gössling et al. (2002) to account for the consumption of recreational and social areas by tourists. Data collected through the survey, but not included in this assessment, indicated that during the event no 'add- on' tourism was undertaken.

Another major boundary-setting problem that arose included the assigning of footprint values to the conference. The most pertinent of these is the allocation of air kilometres. Travel to the AAEE 2004 conference was considered the sole purpose for delegates' trip to Adelaide. However, It is likely that some of the delegate's were using the conference as a stop-over on a multiple destination trip Gössling et al. (2002). Data collection should have therefore attempted to capture this behaviour in an attempt to avoid the possibility of double counting. Though, this has unlikely occurred due to the limited application of EFA at the present time.

With these arguments in mind, the application of EFA emerges as being most appropriate where destinations provide tourists with a 'home-away-from-home' (Hunter, 2002). This is due to the facility in obtaining data on consumption rates and tracking tourist impact activities (Gössling et al., 2002), as well as the ability to apply 'Food and fibre' footprints on the basis of footprints of the nationalities of people visiting the destination. Such assumptions however, are loosely based upon limited research into tourist consumption, as it is likely to vary widely depending on the destination and the tourist type. For example, consumer behaviour may be enhanced at particular destinations, such as Thailand, where more consumer items can be purchased for less money. In such cases, footprint calculations using input-output methods would underestimate the tourist consumption footprint.

Another complication of using EFA to assess events is the question of where to allocate the footprint accounts: the host destination or the source. Presently there is some discourse around repatriating the footprint to the source country (Hunter, 2002; Wackernagel & Yount, 2000). The problematic situation suggested by Wackernagel and Yount (2000) is an Italian departing for Mexico and consequently leaving footprints at take-off, at stop-overs, during the flight itself and then through consumption at the host destination. This issue is also compounded by the fact that tourism flows from the North to the South exceed tourism flows in the opposite direction; this increases any effect of underestimating footprint calculations of the North.

Rather than assigning the footprint to the source destination, however, it seems most fair that footprint values be assigned to those benefiting from the economic activity. This may be either the tourist, who benefits in the form of satisfaction of pleasure- seeking, or the producer who benefits in the form of tourism receipts. The justification for assigning footprint accounts to producers is that in many cases tourism expenditure flows to foreign suppliers, e.g. the international hotel and airline industries. These represent a large component of total expenditure and land consumption for both leisure and professional travel; however, in many cases the financial rewards are not received by the host, nor are the environmental impacts limited to the source or host destination. For this reason footprint accounts should be distributed to those receiving the economic benefits.

From results obtained through this analysis and those by Høyer and Næss (2001) and Gössling et al. (2002) it is evident that activities dependent on aircraft travel need to be reassessed if global sustainability is to be achieved. In the event industry the implications of these results need to be weighed against the intellectual, social and economic benefits demonstrably achieved by the event. Given the high proportion of the Ecological Footprint results from air travel, it is evident that the adoption of environmental initiatives about issues other than air travel will only result in marginal reductions in the Ecological Footprints of events. Hence, event destinations, conveners and delegates must assume the responsibility of minimising travel distances (Gössling et al., 2002). It is perceived that the policy implications of this form of tourism development lies in the hands of the national and state governments that are responsible for tourism promotion. The degree of substitutability between destinations and the importance of receipts obtained through conferences, however, leads to concerns that the competition amongst destinations will lead to a 'tragedy of the commons' scenario (Høyer & Næss, 2001) like that originally described by Hardin (Hardin, 1968).

Given the Ecological Footprint results obtained by this event, questions need to be raised regarding the utility of the event to delegates. Interaction and 'co-presence' (Urry, 1995) amongst experts and professionals no doubt leads to further understanding and information sharing, but whether it is the most efficient and effective means of doing so, and whether substantial outcomes are achieved, must also be factors considered in this form of activity. Høyer and Næss (2001) explore these social and professional benefits in relation to the environmental costs they impose. It is argued that conference participation distracts the attention of delegates from other areas of work and social commitments in other areas, such as teaching, research and family. Høyer and Næss also ascertain that conferences do, to a certain level, positively affect research quality. However, they determined the primary success factors to be the characteristics and size of the conference.

Other economical, sociological and psychological benefits of events exist in the form of prestige obtained by participants on the basis of event destinations. This is termed 'symbol production', whereby prestige amongst peers is achieved through attendance and participation (Høyer & Næss 2001). This prestige also applies for the host destination that may receive worldwide recognition for the event and consequently a larger flow of tourism arrivals. A good example of this is the social hysteria surrounding the host location of the Soccer World Cup and the Olympic Games. This is an important matter when considering the potential social and economic benefits that can be obtained through this form of tourism promotion (Burgan & Mules, 2001; Chalkley & Essex, 1999; Garcia-Ramon, 2000; Horne, 2000).

Central to this analysis however, is the question of whether or not EFA is a true indicator of sustainability. According to Wackernagel et al. (1999) Australia has an ecological remainder of 5.0ha/capita, which may be interpreted by planners and policy makers that Australia is presently using its resources in a sustainable manner. A complex regional analysis by Lenzen and Murray (2001), however, resulted in an Australian Ecological Footprint of 13.6ha/cap. The difference in Ecological Footprint rankings between Wackernagel et al. (1999) and Lenzen and Murray, 2001 are due to the inclusion of regional data accounting for export footprints and the degree of land disturbance. Although the authors acknowledge the ability of EFA to illustrate ecological overshoot, its present ability to accommodate impact areas such as biodiversity, waste assimilation services and water consumption clearly limit its ability to be a comprehensive planning tool. Discourse about, and experimentation into, exploring the integration of these factors will, it is hoped, produce useful developments.

## Conclusion

The results of this analysis demonstrate that activities dependent on international travel place large demands on the globe's bioproductive assets. Given the small size and relatively low international significance of the AAEE 2004 conference, its associated footprint seems startlingly large. It is an issue the tourism industry and, particularly, the environmental/sustainability education industry needs to give serious attention to if it is to be considered a truly sustainable economic, ecological and social activity.

Lowering the impacts associated with events, both destination-based and local, must come from innovations within this industry and reducing attempts to satisfy hedonistic needs. Given that behaviour change within the professional arena has not already occurred, demonstrates that recent technological advancements (e.g. conference calls / internet) are not meeting the needs of professionals.

Considering the potential ecological impacts of this tourism sector and its potential to decrease its footprint using current technology, behaviour change programs emerge as one of the most powerful opportunities. For example, in future conferences AAEE might be able to undertake more virtual, or electronic based activities in order to overcome the travel distance obstacle that exists in Australia. The perceived need for travel within this tourism based activity is a major hurdle and the most promising reduction are likely to come from technological advances in fuel efficiency, or the discovery and application of alternative fuel types.

The complexity of calculating the ecological footprint and using the associated calculation tools are hurdles to overcome. In light of these limitations however, their application in illustrating how consumption impacts the environment is a powerful education and communication tool. The EPA Ecological Footprint Calculator is a powerful program in this respect, as it clearly identifies what activities are imposing the highest impacts. Building the awareness of delegates and tourism operators of their associated impacts can assist in making informed decisions about consumer behaviour, which in turn may lead to much-needed innovation in ways of information sharing and dissemination within a presently destination-based event industry. AAEE is one, if not the first, organisation to undertake such an assessment of its industry conferences. It is hoped that the results of this research provide a baseline for further application, and that it is used in the future design and delivery of improved AAEE events.

## Acknowledgements

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*Keywords*: Ecological Footprint; conferences and events; consumption; AAEE.

## Endnotes

1. http://www.epa.vic.gov.au/projects/eco-footprint/events.asp
2. http://www.epa.vic.gov.au/projects/eco-footprint/events.asp
3. This explains why the total office and administration footprint result in Table 2 amounts to 70% of the sum of the components listed in Table 1.

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