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Providing independent and expert advice on urban water management

Planning for Sustainable Irrigated Open Space

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1. Introduction

A consequence of drought in recent years has been the loss of amenity and disruption to active recreation in Australian cities and towns. The lack of water has resulted in many sports grounds unplayable or at least seriously stressed. Urban horticulture generally has suffered.

Major efforts and resources have been and are being directed at protecting these areas. There are a wide range of strategies, techniques and technologies that are being applied to the task.

The development of an urban site, such as a sports ground, will have impacts both positive and negative, on the land and soil resources of the area. The primary purpose of an irrigation development is to provide some form of social benefit for the community. In terms of meeting sustainability objectives, it is expected that the natural resources will be conserved and potentially enhanced.

There are numerous aspects of the development that need to be considered, if a sustainable site is to be achieved. It is an ongoing process.

Two key aspects of the recommended approach in working towards sustainability of an irrigated area involve the use of appropriate methods/approach and the adoption of an evaluation process that provides a measure of performance.

The measurement and reporting of progress towards sustainability is important not only in facilitating improvement, but also in reporting to stakeholders and the broader community. Identification of the benefits generated by the site should be included in the reporting of the performance.

The purpose of this presentation is to provide an approach or plan in which the key elements involved in working towards sustainability are identified, procedures outlined to carry out the core tasks and key performance indicators identified and defined.

2. Sustainability Principles for Urban Irrigation

The following three principles have been identified by Atkins et al (2006) in the consideration of the sustainability of urban irrigated areas.

(1) Resource preservation for future

Using, conserving and enhancing the land, water and biota resources in urban areas, now and into the future

(2) Maintenance of benefits

Maintaining the economic and social services and benefits to urban communities that enhance the quality of life, now and into the future

(3) Environmental protection

Ensuring the health of river, groundwater and drainage water systems that provide the irrigation water supplies, and maintaining extractions at sustainable levels

Reference: Atkins, D., Maheshwari, B., Simmons, B. and Mulley, P. (2006) *The Sustainability Challenge*, Technical Report No. 03-3/06, Cooperative Research Centre for Irrigation Futures (CRCIF), Darling Heights, Qld., July 2006.

3. The Sustainability Issues

The following issues need to be addressed when considering the sustainability of irrigated urban sites.

(1) Outcomes or services that will be provided by the site. Social, environmental and economic benefits

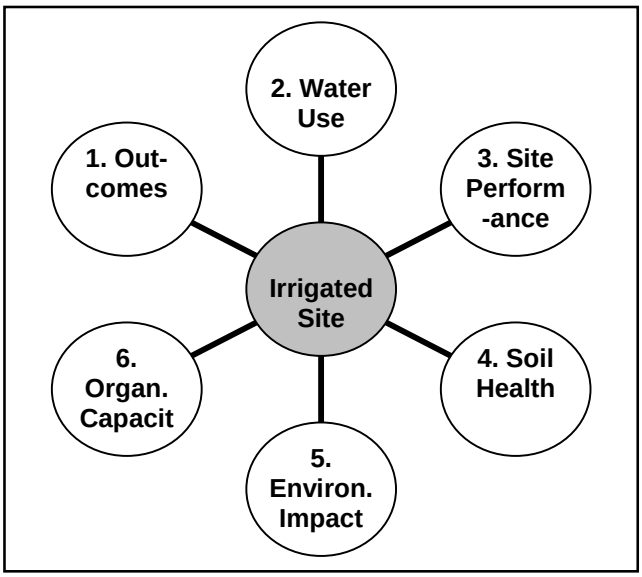
(2) Water source and water use

(3) The performance of the plants and, in the case of the sports grounds, the performance of the surface

(4) Health of the soil

(5) Impact of the irrigation and associated practices on the environment

(6) The capacity of the organization to achieve water goals and efficiency performance targets.



4. Sustainability Issues and Indicators for Urban Irrigated Sites

The following Table identifies the range of Indicators that may be used when evaluating the role of each of the main sustainability issues.

Sustainability Issues	Sustainability Category	Sustainability Indicators
1. Outcomes - Services	Social	Participants per site/venue, User/player hours per unit volume of irrigation water
	Environmental	Green space benefits
	Economic	Income per unit volume, Employment per unit volume
2. Water Use	Water source	Potable and Non-potable, Security of supply
	Water quality	Water quality parameter thresholds (Physical, chemical, biological)
	Water used (Volume)	Total volume, Volume per unit area
	Efficiency of use	Water Use Efficiency (WUE), Productivity, Irrigation efficiency
	Effectiveness of delivery	Uniformity of application, Uniformity of emission, Precipitation Rate
3. Site Performance	Plant performance	Plant condition, Aesthetic quality
	Surface (turf) performance	Surface hardness, Turf coverage, Surface evenness, Carrying capacity
	Root system	Depth of roots

4. Soil Health	Physical properties	Water storage, Infiltration, Water Movement, Aeration, Compaction, Soil bulk density
	Chemical properties	Soil Acidity, Soil salinity, Nutrients, Toxins
	Biological properties	Organic content
5. Environmental Impact	Soil	Soil salinity, Soil toxins, Water logging
	Groundwater	Water quality, Yield, Depth
	Waterways	Water quality (Flora and fauna impact), Quantity, Flow rates, Sediment load
	Energy	Greenhouse gas production
6. Organisation Capacity	Policy	Appropriate water policies, Water management plan
	Data	Accurate data (GIS), Accessible data
	Skills	Training, Qualifications
	Financial resources	Capital, Operating expenses

5. Key Sustainability Indicators for Irrigated Sports Grounds

Sustainability Issue	Key Indicator	Unit
Outcomes – Social	User/player hours per Megalitre per year	h/ML/yr
Water	Source – Potable/Non-potable	%
	Water Application Rate	ML/ha
	Water quality - Salinity	ECw, TDS
	Irrigation Efficiency Index	Ii
	Uniformity of Application (Distribution Uniformity)	DU %
Site Performance	Surface hardness – Clegg Hammer Gravities	G or 10Gs (Clegg)
Soil Health	Soil salinity	ECsoil
Organisation Capacity	Auditor training – Irrigation Efficiency Course (IEC)	Yes/No

6. Case Study: Key Sustainability Indicator Compliance - Irrigated sports grounds

Sustainability Issue	Key Indicator	Industry or Organisation Standard/ Threshold	Site Results	Sustainability Compliance
Outcome – Social	User/player hours per Megalitre (Userh/ML/yr)	3,000 h/ML/yr	4,600 h/ML/yr	✓
Water Use	Source – Potable/Non-potable (%)	0% Potable	100% Potable	***X***
	Water Application Rate (ML/ha)	4.0 ML/ha	5.1 ML/ha	***X***
	Water quality – Salinity (ECw (dS/m), TDS)	0.5 dS/m, TDS 320 mg/L	0.2 dS/m, TDS 128 mg/L	✓
	Irrigation Efficiency Index (Ii)	1.0	1.15	***X***
	Uniformity of Application (Distribution Uniformity) (DU%)	DU 75%	DU 63%	***X***
Site Performance	Surface hardness (G or 10G)(Clegg)	12 (10Gs) (Clegg)	9 (10Gs)	✓
Soil Health	Soil salinity ECsoil (dS/m)	0.8 dS/m	0.5 dS/m	✓
Organisation Capacity	Auditor training – Irrigation Efficiency Course (IEC)	Yes/No	Yes	✓