MULTIPLE WATER USE

Getting more from a "bucket" of water

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I am an irrigation farmer, very reliant on the security of water for my livelihood; I am very concerned with the pressure on the long-term availability of water for irrigated agriculture.

There is not doubt that the value of water will escalate rapidly as we enter the twenty-first century.

Competition from four areas will pressure the value and reliability for water. These areas are Environment, Urban, Industrial and Agricultural. Of these four, Irrigated Agriculture, while placing the highest demand for water, has the least ability to pay.

No one disagrees that we need to find the balance between the use of water for Urban, Industrial and Agriculture, and an allocation for the environment. To this end, Government bodies are promoting to water users that we need to be looking at efficiencies in our use and application of this finite resource

Using water more productively

An area that is not receiving enough research is in the efficiencies of production from a quantity of water. What can we produce from one megalitre of water?

The concept of multiple use of water will be the vehicle that will give us the greatest increase in returns, and allow agriculture to be somewhat more competitive in the water market. Australians can no longer continue to use water once. The volume of water being dumped from our cities into the oceans is a tragedy. Schemes like the Bolivar Scheme in South Australia are reversing this

trend. This Scheme has the potential to deliver 40,000 megalitres per annum of treated effluent from Bolivar Sewerage treatment plant outside Adelaide, to irrigation in the Virginia Park area. It solves the region's groundwater management problems of the serious pollution of the marine environment from the continued discharge of effluent into the Gulf of St. Vincent.

Darling Downs Vision 2000 in Queensland is promoting and investigating the feasibility of bringing Brisbane Waste Water inland to the Lockyer Valley and Darling Downs. The costs of these schemes are extremely high and the ability of agriculture to pay for these projects is a major stumbling block, to the further development and establishment of these necessary projects.

Israel Experience

We now need to look at how we can best use the water available to agriculture. We can learn a lot from the way Nations like Israel have addressed the needs of water use efficiencies of application and production. A country of six million people and a total water availability of two million megalitres. Every drop of water is precious and the efficiency of use of water is incredible. We can use the Israel Experience to get more than one "crop" from a "bucket" of water. One "bucket" of water in Israel can be used between five to seven times before it is totally empty.

Water being pumped from 800 metres underground is first used for Tourist Spas, to warm hot houses and then onto three different species of fish (aquaculture), then this enriched water is used to grow hydroponic crops (eg tomatoes, herbs) then the remainder goes to drip irrigate field crops of olives, melons, and alfalfa. In the Negiv Desert bore water contained over 4000 ppm salts, but the Israeli's were growing ocean prawns with this water, then tomatoes and melons under drip

irrigation. The fruits are very sweet, and because of the calcium-based soil, salt build up was not a problem. This multiple use of water is illustrated in figure 1.

The Challenge

In Australia the norm is to store water on farm - either underground or on-farm storage, and use this water "once" to irrigate crop of pasture.

To me as an irrigated cotton and grain producer, the challenge, while striving to produce high yielding quality crops from my "bucket" of water, is to increase the value of dollars returned per megalitre of water. To a water user, the obvious choice is aquaculture. Fish do not consume water, have a high return per megalitre and can make use of existing infrastructure, with some small modifications, eg use of cage culture in on-farm storages.

The diversity of use is multiple, as can be seen by the Israel Experience. Aquaculture through the Dept. Primary Industries, Barra profit model or N.R.E. Victoria through Aquafarmer, both provide excellent computer models identifying return and costs on aquaculture farms. Dept. Primary Industries is now working on a similar program to combine aquaculture with agriculture (Bill Johnson 1999)

Table 1 shows the production cost per kilogram for an extensive aquaculture production unit of 20 hectares, producing one tonne per hectare a year. Total production costs come in at $3.39 per kilogram or approx. $3,400 per tonne. With a selling price of $8 a kilogram or $8,000 per tonne, the net return is $4,600/tonne or $4,600/hectare.

Table 2 shows the production cost per kilogram for a semi-intensive production unit of 20 hectares producing 5 tonne per hectare a year. Total production costs are $4.43 a kilogram or $4,430 tonne. With the same selling price of $8.00 a kilogram or $8,000 tonne, the net return of $3,570 a tonne. This equates to $17850/hectare.

If we look at an established irrigation farm with existing water storages and we establish an aquaculture enterprise within these storages. Assuming a production of one tonne of fish per megalitre there is a gross return of $8000 a megalitre. After deducting costs of $4500 a tonne of fish we have a return to grower of $3500 a megalitre and the grower still has this water available for irrigation of his preferred crop. The net return from this crop can be added to the net return for aquaculture.

The other encouraging issue with aquaculture is, as we move into this new millennium, finfish and other aquatic products are in increasing demand on the global scene, and the demand for both high value and low value species is increasing due to rising population, more disposable income, and a desire to eat more healthy diets. With globally dwindling yields from many traditional marine and inland capture fisheries; shortfalls in supply of aquatic products will largely need to be meet from the development of an intensive aquacultural industry. The issues and challenges we therefore face in aquaculture particularly, are how to (1) promote aquaculture as a legitimate, long term farming activity and (2) sustain and increase the current utilisation of species and production base. As well as increased technical assistance, achievement in both the private as well as the public sector, will largely depend on positive national policies, that promote the section and also integrate, and give high priority to the collection of necessary and relevant information, on which to make informed decisions.

The potential of aquaculture to meet the challenges of food security and to generate employment and foreign exchange, is clearly demonstrated by the rapid expansion of this sector, which has grown at an average annual rate of 10% since 1984, compared with 3% for livestock meat and 1.6% for capture fisheries production (F.A.O. Fisheries Dept.)

Aquaculture can become a vital industry for rural community development, as significant employment will be generated and consequential impacts on rural recovery can be major, particularly if secondary industry is established regionally, such as processing plants and support industries.

Market Challenge

The challenge of bringing agriculture and aquaculture together does present us with some real issues, especially in my region, where the use of pesticides is quite common on both grain and fibre crops. Not all farm layouts will suit the concept of the introduction of aquaculture and agriculture growing together. Issues of the pesticide drift and tail-water collection would need to be considered before undertaking this project. But with growers much more aware of potential drift and significant advances in application technologies, I can see some terrific opportunities for farmers to improve the net return per megalitre.

As with all developing industries, the need for market development and security is paramount. We have a great opportunity if we undertake the necessary work to encourage the growth of aquaculture, in conjunction with agriculture to enhance the returns per megalitre, the returns to primary producers, and returns to our rural communities.

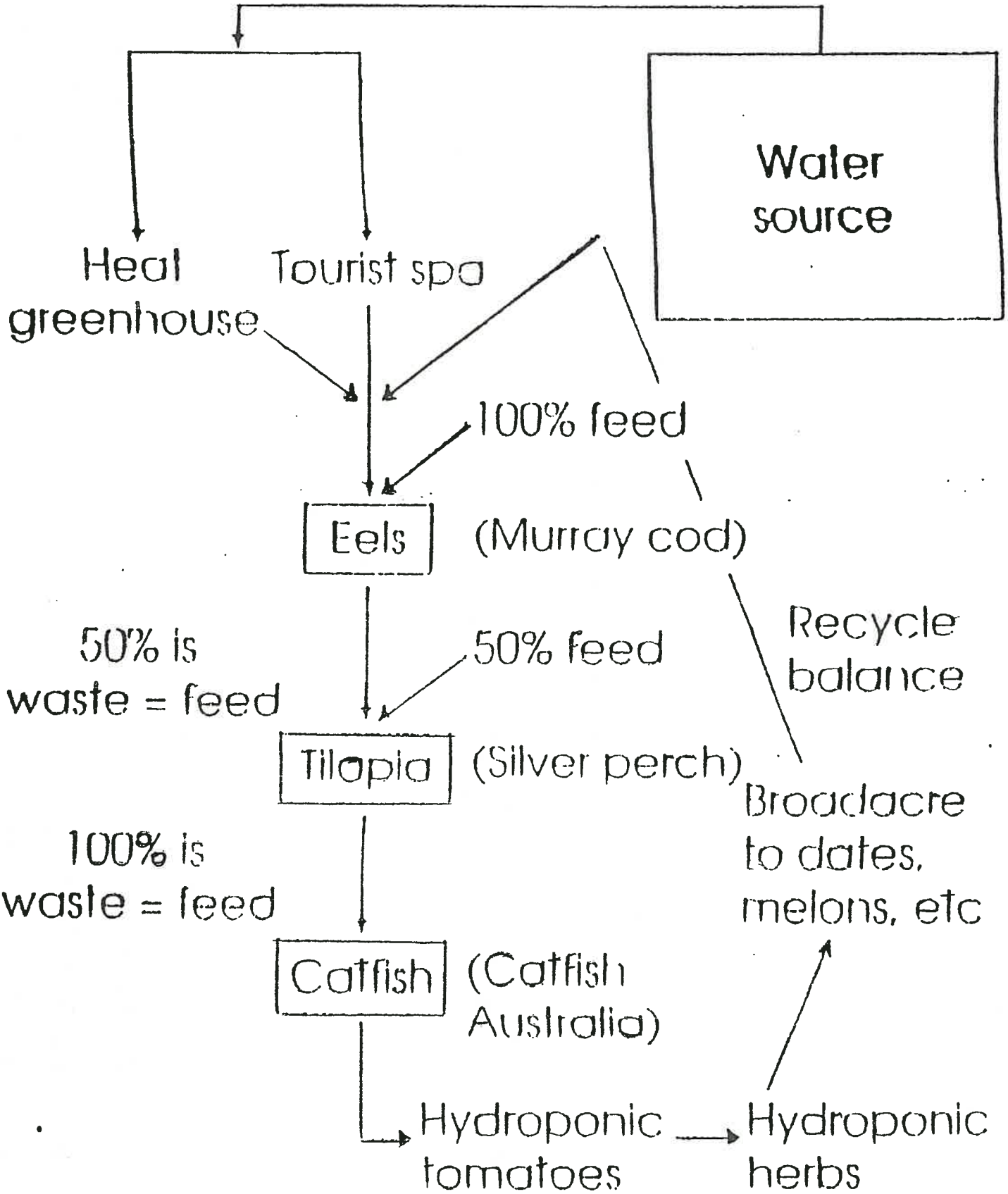
Some of the work needed includes:

- Increased effort in research;
- Stronger industry and government body linkages;
- Market research - local and export
- Transport.

We must look at aquaculture as a sunrise industry in Australia and as a vital step in the multiple use of water. As a producer striving to value add, at every opportunity, to the return per megalitre of water, I would ask industry and government agencies to seize this opportunity to change and create a new era in how we use our water, from urban use and disposal to agriculture use and

efficiencies. There is a tremendous opportunity for all irrigated agriculture to add some form of multiple water use to their farming system, thus increasing their returns and also helping grow our rural communities.

Figure 1: Mulliple use of water: the Israel experience



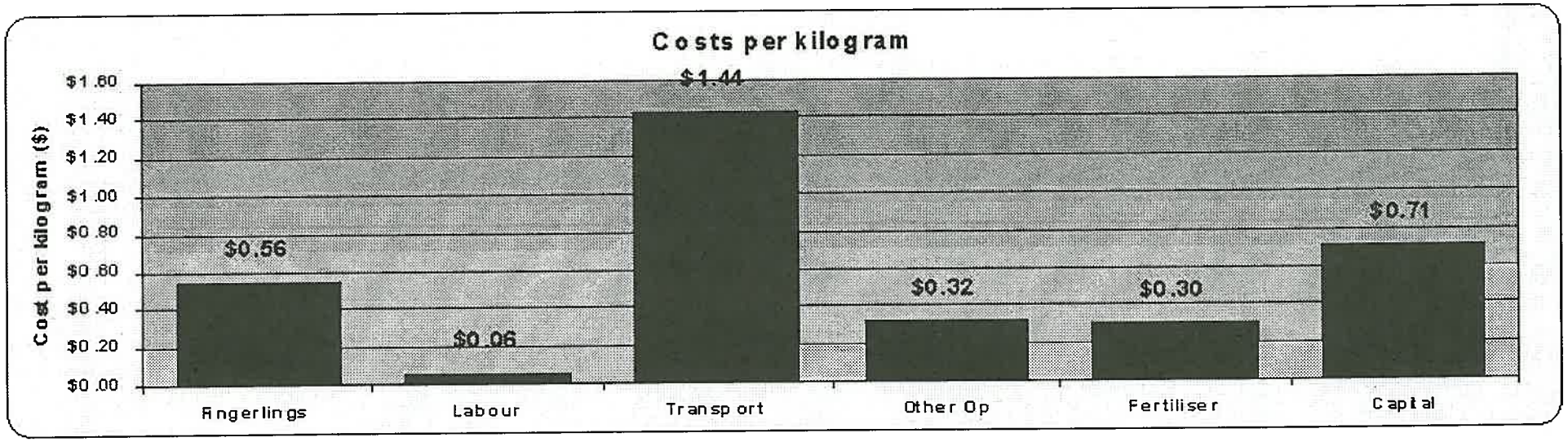
Source: P. Peterson 1999, based on the work of Dr Sam Applebaum, Israel.

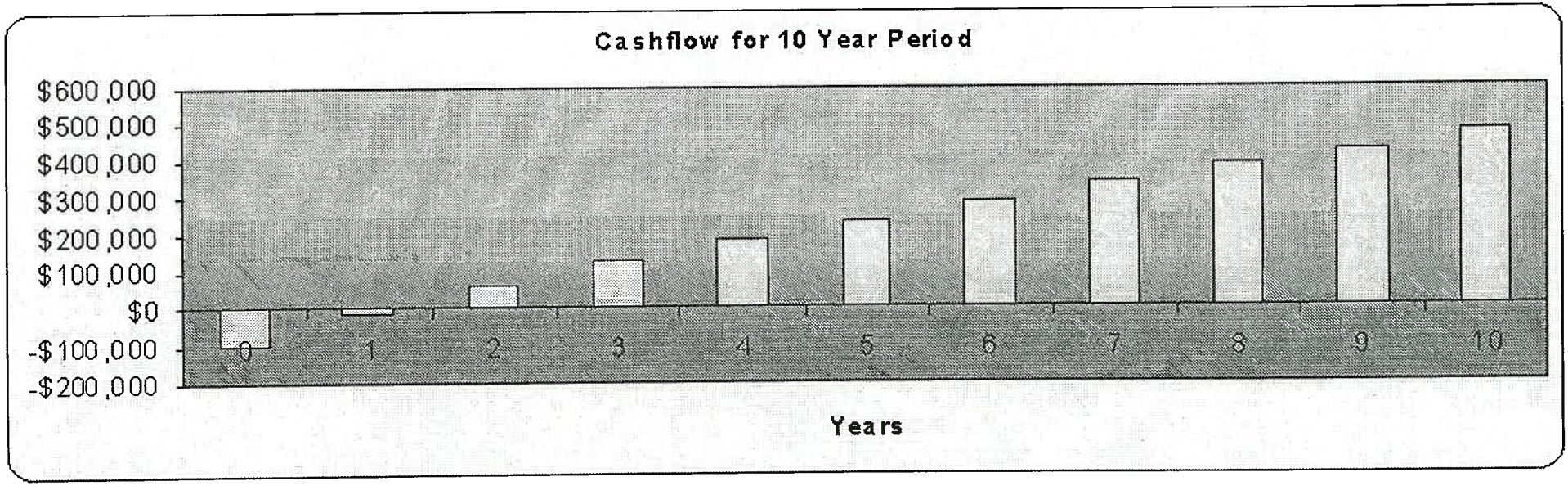
Summary Statistics

TABLE 1

Silver Perch - 1 yr Extensive Model 20 ha - 1t/ha

Annual Profit	$72,198
Internal rate of return	98%
Total production cost per kilogram	$3.39





Summary Statistics

TABLE 2

Silver Perch - 1 yr Semi-Intensive Model 20 hec - 5t/hec

Annual Profit	$267,233
Internal rate of return	158%
Total production cost per kilogram	$4.43