Correlation between the quantity of water and daily and hourly exchange rates

Daily exchange rate	Hourly exchange rate	litres/min to supply 1 m³ tank	litres/sec to supply 1 m³ tank
1	0.0	0.7	0.01
2	0.1	1.4	0.02
3	0.1	2.1	0.03
4	0.2	2.8	0.05
5	0.2	3.5	0.06
6	0.3	4.2	0.07
7	0.3	4.9	0.08
8	0.3	5.6	0.09
9	0.4	6.3	0.10
10	0.4	6.9	0.12
11	0.5	7.6	0.13
12	0.5	8.3	0.14
13	0.5	9.0	0.15
14	0.6	9.7	0.16
15	0.6	10.4	0.17
16	0.7	11.1	0.19
17	0.7	11.8	0.20
18	0.8	12.5	0.21
19	0.8	13.2	0.22
20	0.8	13.9	0.23
21	0.9	14.6	0.24
22	0.9	15.3	0.25
23	0.96	16.0	0.27
24	1.00	16.7	0.28
25	1.0	17.4	0.29
26	1.1	18.1	0.30
27	1.1	18.8	0.31
28	1.2	19.4	0.32
29	1.2	20.1	0.34
30	1.3	20.8	0.35
31	1.3	21.5	0.36
32	1.3	22.2	0.37
33	1.4	22.9	0.38
34	1.4	23.6	0.39
35	1.5	24.3	0.41
36	1.5	25.0	0.42
37	1.5	25.7	0.43
38	1.6	26.4	0.44

Daily exchange rate	Hourly exchange rate	litres/min to supply 1 m³ tank	litres/sec to supply 1 m³ tank
39	1.6	27.1	0.45
40	1.7	27.8	0.46
41	1.7	28.5	0.47
42	1.8	29.2	0.49
43	1.8	29.9	0.50
44	1.8	30.6	0.51
45	1.9	31.3	0.52
46	1.9	31.9	0.53
47	2.0	32.6	0.54
48	2.0	33.3	0.56
49	2.0	34.0	0.57
50	2.1	34.7	0.58
51	2.1	35.4	0.59
52	2.2	36.1	0.60
53	2.2	36.8	0.61
54	2.3	37.5	0.63
55	2.3	38.2	0.64
56	2.3	38.9	0.65
57	2.4	39.6	0.66
58	2.4	40.3	0.67
59	2.5	41.0	0.68
60	2.5	41.7	0.69
61	2.5	42.4	0.71
62	2.6	43.1	0.72
63	2.6	43.8	0.73
64	2.7	44.4	0.74
65	2.71	45.1	0.75
66	2.75	45.8	0.76
67	2.8	46.5	0.78
68	2.8	47.2	0.79
69	2.9	47.9	0.80
70	2.9	48.6	0.81
71	3.0	49.3	0.82
72	3.0	50.0	0.83
73	3.0	50.7	0.84
74	3.1	51.4	0.86
75	3.1	52.1	0.87

Water flow and fish size

- Water should not flow faster within 1 second than the actual total length of the reared fish. However, the maximum velocity of water should not exceed 20 cm/sec (12 m/min) even if the fish is longer than 20 cm.

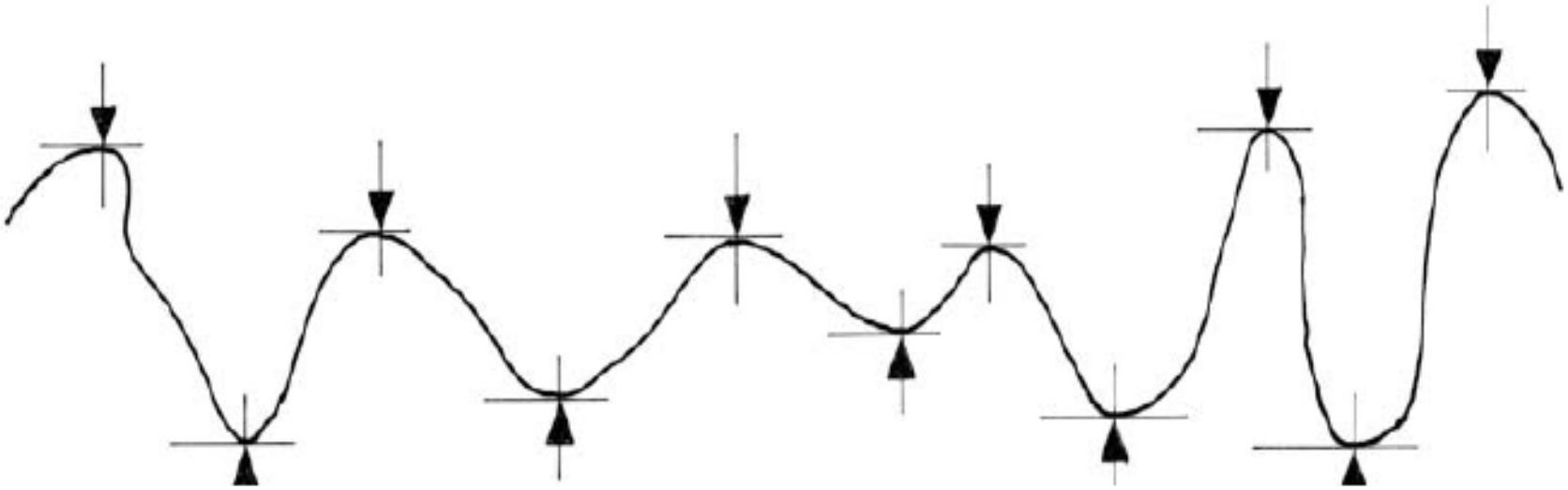
- The optimal velocity of water is 2–3 cm/sec (1.2–1.8 m/min) for smaller fish and 4–10 cm/sec (2.4–6 m/min.) for larger ones. However, the actual speed of water per second should not be faster than from one-half to three-quarters of the length of the reared fish.

Site Selection

Water Quantity and Quality

FIGURE 32

Seasonal fluctuations in the quantity of available water



Note: The upper arrows indicate the levels of available maximum quantity of water and the lower arrows indicate the levels of available minimum quantity of water.

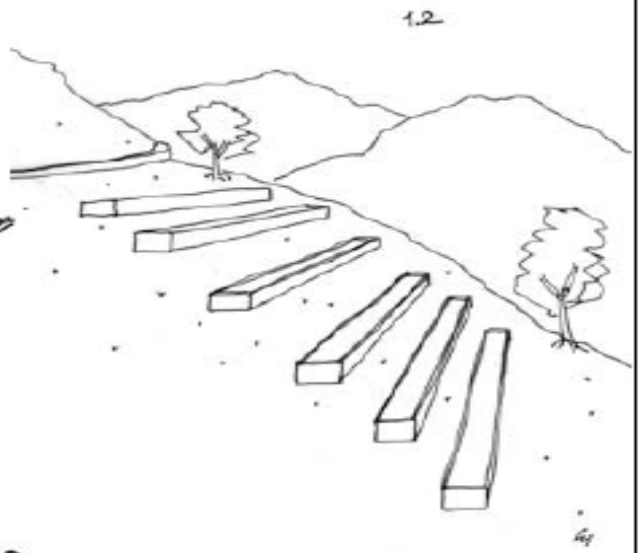
Slope and Soil Quality

FIGURE 33

Importance of slope and soil quality in site selection

1. Slope of the site and arrangement of tanks

It is important to select a site with substantial slopes. This will ensure the filling and drainage of the rearing tanks by gravity. **1.1** If a site has a gentle slope, the tanks can be arranged along it. **1.2** If the site has a steeper slope, the tanks should be arranged parallel to the slope.



2. Soil quality

The requirements for building a fish farm depend on the type of buildings and earth/concrete structures planned.

For concrete tanks, the soil should be strong enough to hold the foundation of the tanks.

For earth ponds, the structure, *consistency** and *permeability** of the soil should be suitable for building strong dykes.

Sources ADCP (1984); Coche (1988, 1989); Coche, Muir and Laughlin (1995).

Basic Economic Calculations of Investment and Production

Economic calculations of investment are completed both before start (planning phase) and after completion of the implementation of a trout production unit or farm. The following calculations should usually be completed at the planning phase and by evaluation of investment:

- Total cost of investment: It is compiled from the costs of items listed in Table A10.9. Both the total costs and the proportions of the different items of investment should be observed in the analyses.
- Internal rate of return (IRR): It is the financial or economic indicator of the net benefits expected from a project or enterprise. It is expressed as a percentage. In a financial analysis, the IRR should be compared with the rate of interest prevailing in the market (Leopold, 1978).
- Net present value (NPV): The value of an enterprise at the present time, after applying the process of discounting to its costs or benefits (Leopold, 1978). This value is calculated for a period of ten years with the current applicable bank interest rate.
- Payback period: This indicator shows the needed time (in years) for the investment to pay back its expense.

Economic calculations of production are calculated in order to obtain exact information about the economic results of fish production. The production cost is calculated both before (in the planning phase) and after production. The calculations are:

- Total cost of production includes the cost of a wide range of items listed in Table A10.9. During the analyses, both the costs and the proportions of the different items of production should be observed.
- Unit price is calculated in order to establish profitable production. When planning, both *break-even** and expected unit prices should be calculated.
- Gross revenue expresses the total value of production that is realized on the market.
- Profit is the financial benefit of the production. Gross and net profits are distinguished. Taxes are paid on the basis of gross profit. Consequently, net profit is the amount that remains after paying taxes.

Checklists for planning and evaluation of investment and production

1		Engineering design
2		Technological design
3		Land
4		Permissions
5		Taxes
6		Earthworks
7		Tanks
8		Concrete structures
9		Buildings
10		Roads
11		Fences
12		Machines
13		Vehicles
14		Fittings and devices
15		Apparatus
16		Equipment
17		Tools
18		Furniture
19		Broodfish
20		Miscellaneous

Items of production costs

1		Fish (eggs, fry, fingerling)
2		Feeds
3		Materials
4		Energy (electricity, fuel, etc.)
5		Labour
6		Maintenance
7		Miscellaneous
8		Bank fees
9		Insurance

Production-related expenses

1		Depreciation
2		Taxes

The End

Thank You!