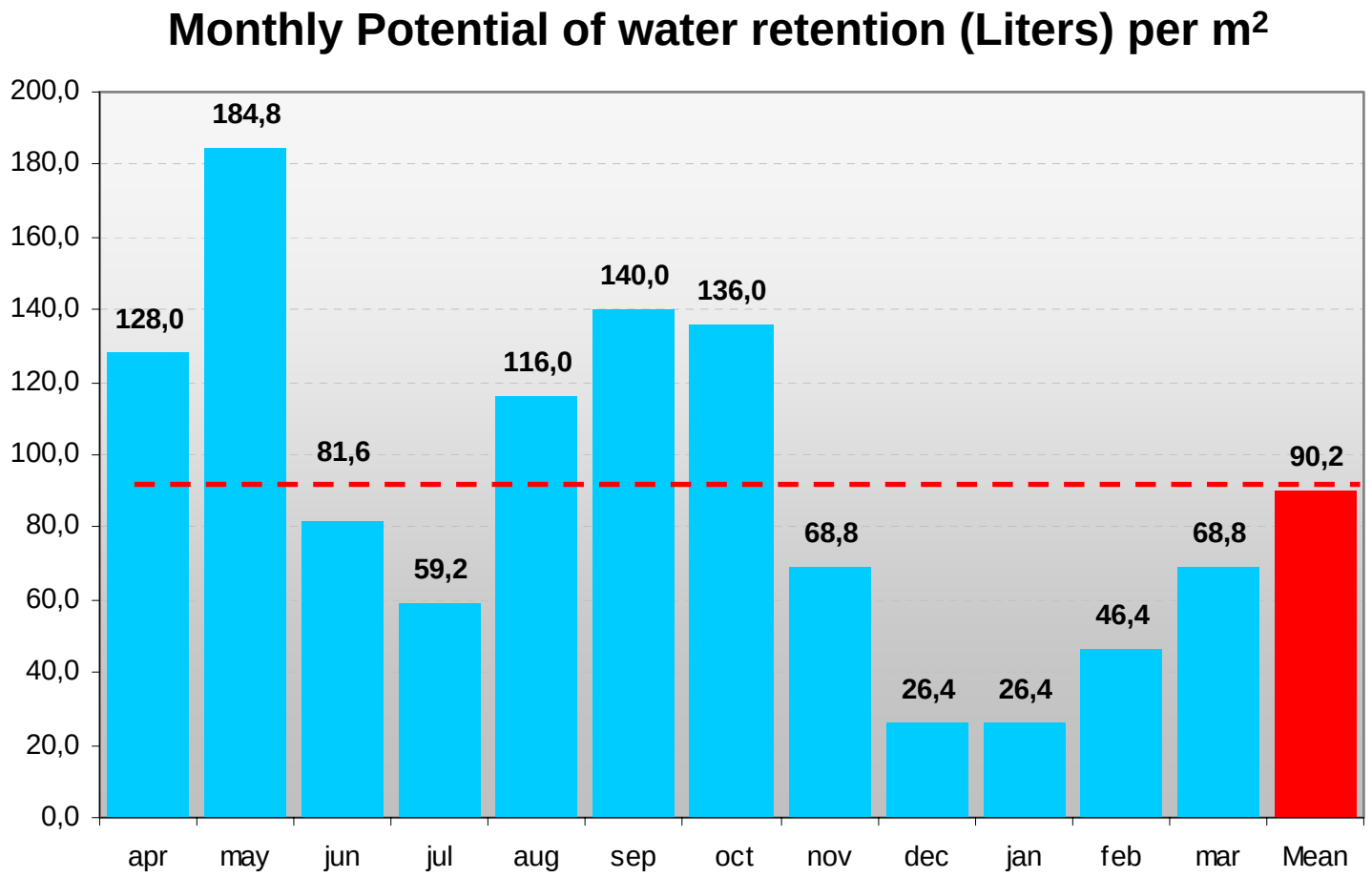
Rain Water Harvesting – Bel Air – Haiti

- We have an average monthly precipitation per m^2;
- Considering a loss of 20% (evaporation, etc.);
- Considering a retention (harvesting and storage) of 80% of precipitation per m^2;



Rain Water Harvesting – Bel Air – Haiti

- We know the number of days for each month;
- If we compensate the leap year using 28,25 days in February;
- We can calculate an average monthly retention per m^2, for each month;

Average daily Potential of water retention (Liters) per m^2

Month	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb	mar
Monthly retention	128,0	184,8	81,6	59,2	116,0	140,0	136,0	68,8	26,4	26,4	46,4	68,8
Days for each month	30	31	30	31	31	30	31	30	31	31	28,25	31
Daily retention	4,27	5,96	2,72	1,91	3,74	4,67	4,39	2,29	0,85	0,85	1,64	2,22

Rain Water Harvesting – Bel Air – Haiti

- We consider an average daily retention per m^2 in 3 liters of water;
- We take as a parameter the consomption of 3 liter of water per day, per person;
- Supposing that it rained every day of the year, 3 liters per square meter, we could say that each person consume the water retained from 1 m^2;
- We calculate the daily balance (remainder or shortage) per m^2 (or per person), for each month;
- We calculate for each month, the remainder or lacking volume of water (multiplying the daily balance by the number of days);

Monthly balance of water retention (Liters) per m^2 (or by person)

Month	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb	mar
Daily retention	4,27	5,96	2,72	1,91	3,74	4,67	4,39	2,29	0,85	0,85	1,64	2,22
Daily balance	1,27	2,96	-0,28	-1,09	0,74	1,67	1,39	-0,71	-2,15	-2,15	-1,36	-0,78
Monthly balance	38,00	91,80	-8,40	-33,80	23,00	50,00	43,00	-21,20	-66,60	-66,60	-38,35	-24,20

In April we will have a remainder of 38,0 liters per m^2

In July we will have a shortage of 3,8 liters per m^2

In October we will have a remainder of 43 liters per m^2

Rain Water Harvesting – Bel Air – Haiti

Calculating monthly balance of water per m^2, we have to consider:

- During the months where there is a shortage of water, we will have to find other supplying options;
- During the months where there is a water remainder, we will have to keep it in a reservoir;
- Then, we accumulate the monthly balance to calculate the spikes;

Accumulated monthly balance of water (Liters) per m^2 (or per person)

Month	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb	mar
Monthly balance	38,0	91,8	-8,4	-33,8	23,0	50,0	43,0	-21,2	-66,6	-66,6	-38,4	-24,2
Accumulate the monthly balance	38,0	129,8	121,4	87,6	110,6	160,6	203,6	182,4	115,8	49,2	10,9	-13,4

We should observe the extreme values:

- At the end of October, we should have stored in a safe place (reservoir) 203,6 liters per each m^2 of harvesting area;
- At the end of March, we will have a shortage of 13,4 liters for each m^2 of harvesting area; (We could attenuate this shortage during the whole month, e.g.: maximum 2 liters per person allowed during the days of the week)

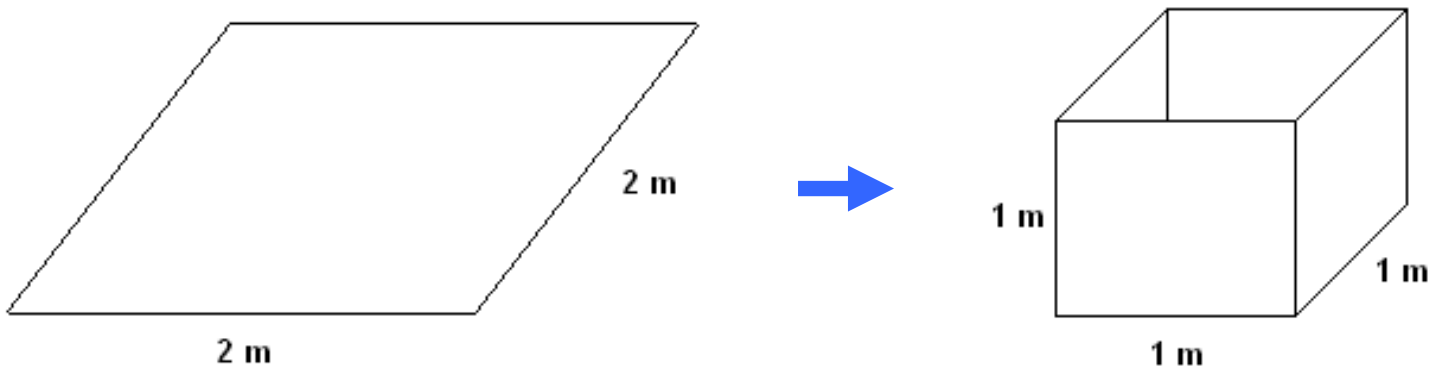
Rain Water Harvesting – Bel Air – Haiti

Minimum storage capacity:

- We can deduce that the minimum storage capacity required will be of 203,6 Liters per m^2;
- Meaning:

  1.018 liters (aproximately 1 m^3) for each 5 m^2 of harvesting;
- Having in mind a variation margin of +/- 20%;
- We would have the following relation:

For each 4 m^2 of harvesting, we should have a storage capacity of 1 m^3 of water



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- Considering that our area of action of working area of 70.000 dwellers;

- We should reach:

70 mil m^2 of harvesting and
a reservoir of 17.500 m^3;

In order to serve 3 litros of drinking water per person.

Rain Water Harvesting – Bel Air – Haiti

Estimate cost for construction

Cost of 1 m^3 reservoir	USD 125,00

Considering 70.000 people and a 17.500 m^3 reservoir

Total cost	USD 2.187.500,00
Investment cost per person	USD 31,25

Rain Water Harvesting – Bel Air – Haiti

Conservation cost for 1 m^3 storage

Considering one manager (USD 250,00 x 12 meses)	
and a 125 m^3 reservoir or a 500 m^2 roof	USD 3.000,00
Cost of 1 m^3 stored	USD 24,00
Cost per m^2 (or person) per year	USD 6,00

Rain Water Harvesting – Bel Air – Haiti

Consumption and annual revenue

Considering 365,25 days during the year and 3 liters per day

Average annual consumption of liters per person	1.096	litros

Annual revenue per person

Suposing 1 Gourde per Liter, annual revenue	USD 31,31
Maintenance cost per m^2 or person per year	USD 6,00
Annual revenue balance per person and/or m^2	USD 25,31