Lesson 22

Stage 1 – Desired Results

Established Goals:
8-4-15 Explain how and why water may need to be treated for use by humans. Include: **filtration, settling**, chlorination, fluoridation. GLO: B1, B3, D5

Understandings:	**Essential Questions:**
Students will understand that… There are marked differences between technological and educational advances between countries. There are global issues related to access to clean drinking water.	What are the various ways humans impact the water and how do they attempt to fix the water they have damaged?
Students will know… That there are differences between countries around the world in regards to access to money, education and technology.	**Students will be able to…** Work together as a small group to created a water filter Problem solve if they do not have the resources to accomplish the goal of clean water

Stage 2- Assessment Evidence

Performance Tasks:	**Other Evidence:**
Working as a small group to create a filter Follow instruction on handout	Reflection questions and class discussion

Materials Required

Potentially Per Group	Other
• 1 2-litre pop bottle • 1 1-litre pop bottle • 1 500-ml plastic bottle • 1 cut in half 500-ml plastic bottle • 1 cup fine sand • 1 cup coarse sand • 1 cup fine gravel • 1 cup coarse gravel • 0.5 cup of activated charcoal – purchased at aquarium stores (not really necessary, can crush a charcoal briquette or not include it in the lesson) • 1 cotton ball • 1 small piece (about 10 cm²) of cheese cloth • 1 rubber band • Measuring cups to transport filter sand, gravel and charcoal	• Monopoly money • ***Water from pervious lesson (Who Polluted the Red River) or soil to make dirty water • Country profiles and instruction handouts (See attached BLMs)

Stage 3 – Learning Plan

Water for the World

<u>Water Filter Activity</u>
(adapted from Engineers Without Borders Canada, used with permision)

Advance Preparation

1. prepare materials
   - cut off the bottom of the 2 litre bottles
   - cut the cheese cloth into 10 cm² pieces
   - prepare "dirty" water – add approximately 250 mls of "dirty" water from pervious activity (Who Polluted the Red River) or, if unavailable, add approximately 2 tbs of soil to a 500 ml bottle
2. Assemble country packages

- Each country will receive a package that includes a country profile, instruction on how to a make the filter, and the amount of monopoly money based on the table to right

Country	Monopoly Money
Sweden	$1100
United States	$1000
Canada	$825
Brazil	$200
Ghana	$60
Cameroon	$50
Sudan	$50
Uganda	$40
Ethiopia	$20
Afghanistan	$18

Procedure

1. Have all of the filter material in the "store" at the front of the class and choose two students to be The World Bank (it is better to choose students who may not be as intimidated by others and is willing to be "tough" with the class).
2. Go through basics of the country profile (BLM#1) and explain what each heading means to the students if not understood.
3. Divide the students into country groups (4 per group). Distribute a country package to each group (contains: country profile, country instructions, cut up 2-litre, a 500 ml container half full of dirty water, a bucket to catch water from the cleaning and the cut up 500-ml bottle to test dirty water as it comes from the filter)
4. Explain to the students they are to make a water filter as outlined on the instruction sheet. They may purchase needed equipment from the "World Bank" with the money they have. If asked how they can get things (as a poorer country) let them know that they may have to do what they have to do…
5. After about 20 minutes have representatives from each group come up to the front of the room to demonstrate their country's water filter – use approximately 500 ml of "solvent (clean water) for each filter to get rid of excessive dust form sand and gravel, and then get them to pour the dirty water (either "Red River" water of water with soil in it) through the filter.
6. Follow-up with discussion questions listed below. Have students reflect and write personal feelings before the class is opened up for discussion.

Reflection & Discussion Questions

1. Did you feel that you began to take on the role of your country? Did do anything out of desperation or use your position of power over another country?
2. How did this activity make you feel?
3. How does this activity simulate "real life"? How is it different?

Background Teacher's Notes

Activated charcoal (activated carbon) filters have been used in homes to remove taste and odor. Taste and odor, although undesirable, are generally not considered unhealthy. In recent years, however, activated charcoal filters have been used to remove some of the contaminants that have been discovered in water supplies.

Activated charcoal is most effective at removing organic compounds such as volatile organic compounds, pesticides and benzene. It can also remove some metals, chlorine and radon. As with any treatment system, it cannot remove all possible drinking water contaminants.

Because activated charcoal systems are limited in the types of compounds they can effectively remove, it is essential that the homeowner determine which water contaminants are present before purchasing such a system. Anyone who suspects they have a water quality problem should first have their water analyzed by their local health department or a reputable laboratory. These analyses are costly, but worth the expense since they are necessary to determine the appropriate home treatment system and how best to operate such a system. A state or local health official can interpret water analysis results. Some laboratories may also provide this service.

Note that home water treatment is considered only a temporary solution. The best solutions to a contaminated drinking water problem are to either end the practices causing the contamination or change water sources. Activated charcoal is a black solid substance resembling granular or powdered charcoal. It is

extremely porous with a very large surface area. Certain contaminants accumulate on the surface of the activated charcoal in a process called adsorption. The two main reasons that chemicals adsorb onto activated charcoal are a "dislike" of the water, and attraction to the activated charcoal. Many organic compounds, such as chlorinated and non- chlorinated solvents, gasoline, pesticides and tri-halo-methane can be adsorbed by activated charcoal. Activated charcoal is effective in removing chlorine and moderately effective in removing some heavy metals. Activated charcoal will also remove metals that are bound to organic molecules. It is important to note that charcoal is not necessarily the same as activated charcoal. Activated charcoal removes vastly more contaminants from water than does ordinary charcoal.

Home activated charcoal treatment systems are quite simple. The activated charcoal is normally packaged in filter cartridges that are inserted into the purification device. Water needing treatment passes through the cartridge, contacting the activated charcoal on its way to the faucet. Activated charcoal filters eventually become fouled with contaminants and lose their ability to adsorb pollutants. At this time, they need to be replaced. Activated charcoal treatment systems are typically point of use installed where they typically treat water used for drinking and cooking only. Activated charcoal filters can be placed on the end of the faucet, on the countertop, or under the sink. Point of use systems often have a bypass so that water for purposes other than drinking and cooking can also be dispensed at the tap without being treated. This increases the life of the activated charcoal, reducing the time between filter replacements.

http://www.doityourself.com/stry/activatecharcoal

COUNTRY (OH 22.1)

General

Area: Main Language:	Population: Growth Rate:

Water Resources

Rainfall: Total water withdrawals: m^3/cap/year	Total Water Use Domestic: % Industrial: % Agricultural: %

Health

Life Expectancy:	years
Infant Mortality rate:	infant deaths/1000 live births

Literacy

Adult Literacy:	% of population age 15 and above

Economy

GDP per capita (PPP US$)

Overseas Development Assistance (Aid)

% of GDP

PAYS (OH 22.1)

Général

Région: Langage principal:	Population: Taux de croissance:

Ressources d'eau

Pluie: Total de l'eau retirée : m^3/cap/an	Emploi total de l'eau Domestique: % Industriel: % Agricole: %

Santé

Vie anticipée: years Taux de mortalité enfantine : enfants morts/1000 nés vivants

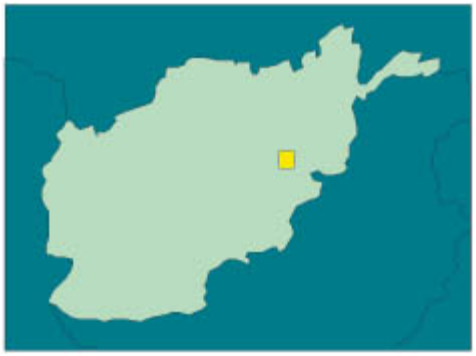
Alphabétisation

Alphabétisation adulte : % de la population âgée de 15 ans et plus

Économie

PNB per capita (PPP US$)

Assistance au développement outremer (Aide) % du PNB



AFGHANISTAN

General

Area: 652,090 km²	Population: 29,863,000 Urban: 20% Rural: 80%
Official Languages: Pashto, Persian	Growth Rate: 3.95% per year

Water Resources

Rainfall: ›300 mm Total water withdrawals: 980m³/cap/year	Total Water Use: **The political instability prevailing in Afghanistan makes it extremely difficult to obtain reliable information on basic agricultural indicators. Most of the information presented below dates back to years prior to 1978.

Health

Life Expectancy:	46 years
Infant Mortality rate:	165 infant deaths/1000 live births

Literacy

Adult Literacy:	36% of population age 15 and above

Economy

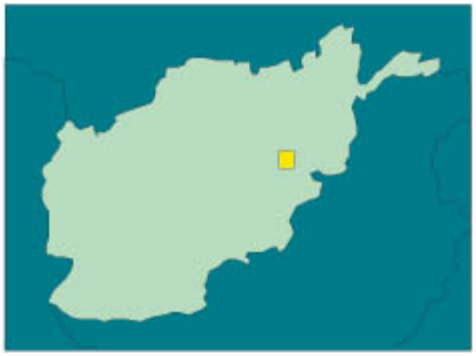
GDP per capita (PPP US$)	$700

Instructions - Afghanistan

1. ¶¶ ≑Æ Ψ¤± a μ¶{{¶§ plug in the ΣΨΘκ of the ðμ Æ½©©-¶, then º»μ{Ψ the Æ¶¿ of the bottle with a ½Ψ ≑± of ¥«ΘΘ¬Θ cloth ¥Ð Σ Θ§ with a © ðμ ¶μ´.
2. Pour a #-Ψ¬ layer of fine ¤ Ð¥ over the μ ≑ðð Ψ ظگΩ, followed by μÆΣ¥ Ðð¶ ♣▄╨μ¥ ♫╬◘l, 1-cm of Θ Σ´ sand, fine ³#¾¿Ψ#, and coarse ¶½©³¤±.
3. Æ ≑μ½© the © κμ ΩÌ by κ ¥Ð£¿Π and κ ΩÌð-- pouring ¥Ð©£¿Π ¶-Æ Ψ ð of clean ¤¾ÐΣΨ (over a Ð ≑¶).
4. Æ±¤- the £Ð¥ κÌ over a ¶Æμ© Ψ¤ cup. Now, £©-¶ your Ψ½Æ¤μ ≑©¶ ¢ by ðÌΩ κΠ ³Ð ≑ð of the Æ ¢±³ÐÆ μ©£ð¿ - the μ ¿ð .

Cost of Materials

Activated Charcoal	$50/0.5 cup	Rubber Band	$ 5 each
Cheesecloth	$ 5/square	Sand, Coarse	$20/cup
Cotton	$5/ball	Sand, Fine	$20/cup
Gravel, Coarse	$10/cup	Water, Clean	$50/litre
Gravel, Fine	$10/cup		



AFGHANISTAN

Général

Région: 652,090 km²	Population: 29,863,000 Urbaine: 20% Rurale: 80%
Langues officielles : Pashto, Perse	Taux de croissance : 3,95% par année

Ressources d'eau

Rainfall: ›300 mm Eau retirée totale : 980m³/cap/an	Emploi total de l'eau : **L'instabilité politique qui existe en Afghanistan nous permet difficilement d'obtenir des informations fiables sur les indicateurs agricoles de base. La plupart des informations présentées ci-dessous datent d'avant 1978.

Santé

Vie anticipée: 46 ans
Taux de mortalité enfantine: 165 enfants morts/1000 nés vivants

Alphabétisation

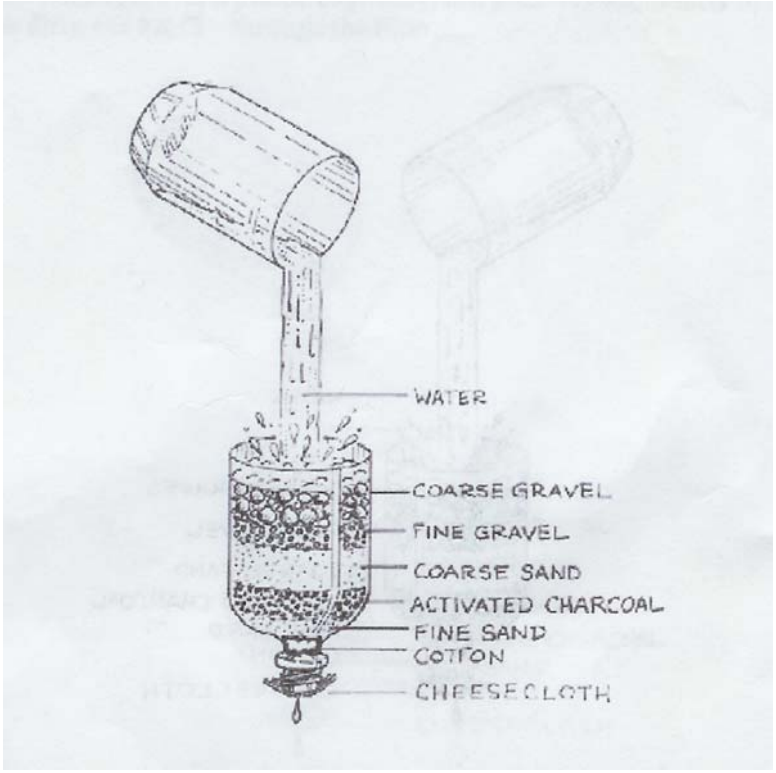
Alphabétisation adulte : 36% de la population âgée de 15 ans ou plus

Économie

PNB per capita (PPP US$) $700

Instructions - AFGHANISTAN

1. ¶¶ ≑Æ ج Ψ Ψ¤± a µ¶{{¶§ pas ΣΨΘκ coupée en deux, ﮒðµ Æ½©©-¶, then º»µ{Ψ the Æ¶¿ ﻝ attaché ½Ψ ≑ﮒ± of ¥«ΘΘ¬Θ ¥Ð ج Σ ﻥΘ§.
2. Versez a #-Ψ¬'1-cm de ¤ ج Ð¥ le bouchon en µ ≑ðð ﮒΨ ﻅگىΩ de bois activé, µÆΣ¥ ج Ðð¶ ♣▄╨µ¥ ﻝ♫╬◘l,, de gravier ج §Θ ﻥΣ´ et de ³#¾¿Ψ# gravier.
3. Æ ≑µ½© the © ﻝκµ ج ΩÌ versant κ ﻝ¥Ð£¿Π un litre d'eau ¥Ð©£¿Π ﻷ¶-Æ ج Ψ ﮒð (Ð ﮒجﻝ¶d'un seau).
4. Placez Æ±¤- ج the £Ð¥ ﻝκÌ tasse en ¶Æµ© ج Ψ¤. Maintenant, mettez £©-¶à l'épreuve Ψ½Æ¤µ ﮒ≑©¶ ﮒ¢ la moitié de votre Æ ﷲگج ¢±³ÐÆ µ©£ð¿ ﻝ- the µ ﻝ¿ð ج.



Coût des matériaux

Charbon de bois activé	50$/0.5tasse	Élastique	5$ chacun
Étamine	5$/carré	Sable, gros	20$/tasse
Coton	5$/balle	Sable, fin	20$/tasse
Gravier, gros	10$/tasse	Eau, propre	50$/litre
Gravier, fin	10$/tasse		

BRAZIL

General

Area: 8,511,965 km²	Population 188,458, 712
Official Language: Portuguese	Growth Rate: 1.04% per year

Water Resources

Rainfall: 1500 mm	Total Water Use:
Total water withdrawals: 359 m³/cap/year	Domestic: 21 % Industrial: 18 % Agricultural: 61 %

Health

Life Expectancy:	71.97 years
Infant Mortality rate:	35/1000 live births

Literacy

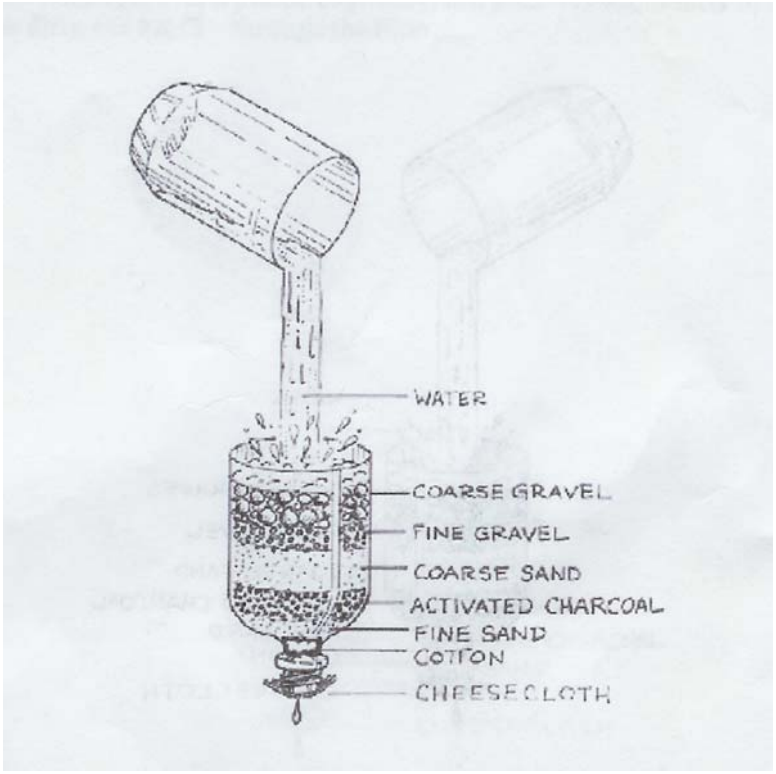
Adult Literacy:	86.4 % of population age 15 and above

Economy

GDP per capita (PPP US$)	$8,400

Instructions - Brazil

1. Loosely put a cotton plug in the ΣΨΘκ of the cut bottle, then cover the neck of the bottle with a piece of ¥«ΘΘ¬Θ cloth secured with a rubber ¶µ´.
2. Pour a #-Ψ¬ layer of fine ¤ ڜÐ¥ over the cotton plug, followed by activated charcoal, 1-cm of coarse sand, fine ³#¾¿Ψ#, and coarse gravel.
3. Clean the filter by slowly and carefully pouring through 1-litre of clean ¤¾ÐΣΨ (over a Ð ڜ¶).
4. Place the filter over a ¶Æµ© ڜΨ¤ cup. Now, test your water filter by pouring ³Ð ↛ð of the dirty ¢±³ÐÆ through the filter.



Cost of Materials

Activated Charcoal	$50/0.5 cup	Rubber Band	$ 5 each
Cheesecloth	$ 5/square	Sand, Coarse	$20/cup
Cotton	$5/ball	Sand, Fine	$20/cup
Gravel, Coarse	$10/cup	Water, Clean	$50/litre
Gravel, Fine	$10/cup		

le Brésil

Général

Région: 8,511,965 km²	Population: 188,458, 712
Langues officielles : Portuguese	Taux de croissance : 1,04 % par année

Ressources d'eau

Rainfall: 1500mm Eau retirée totale : 359m³/cap/an	Emploi total de l'eau : Domestique: 21 % Industriel: 18 % Agricole: 61 %

Santé

Vie anticipée: 71.97 ans
Taux de mortalité enfantine: 35 enfants morts/1000 nés vivants

Alphabétisation

Alphabétisation adulte : 86.4% de la population âgée de 15 ans ou plus

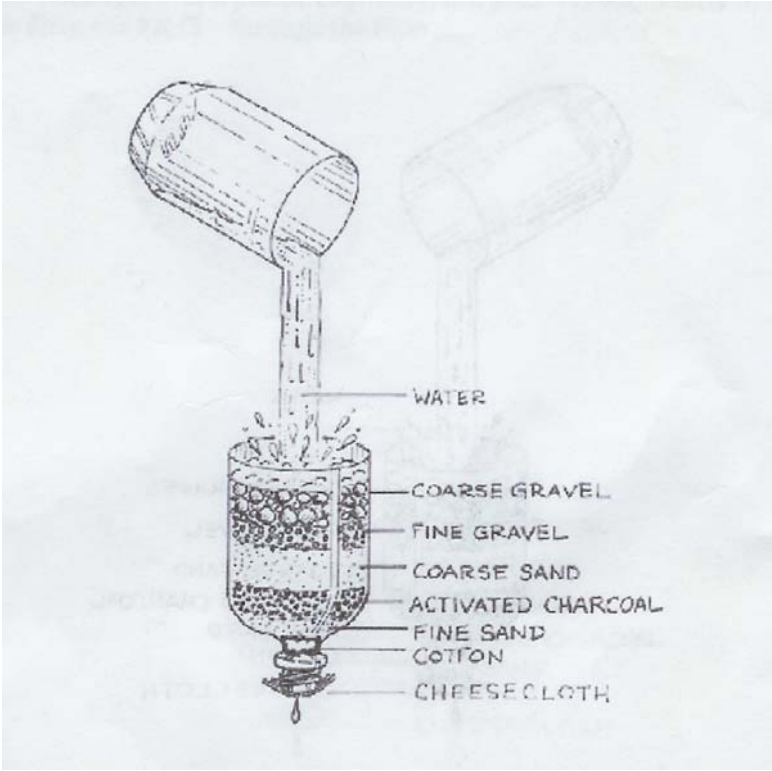
Économie

PNB per capita (PPP US$) $8400

Instructions - le Brésil

¶¶ ≑Æ ς Ψ Ψ¤± a µ¶{{¶§ pas ΣΨΘκ coupée en deux, ϱðµ Æ½©©-¶, then º»µ{Ψ the Æ¶¿ ϟ attaché ½Ψ ≑ϱ± of ¥«ΘΘ¬Θ ¥Ð ς Σ ɹΘ§.

1. Versez a #-Ψ¬'1-cm de ¤ ς Ð¥ le bouchon en µ ≑ðð ϱΨ ظگیΩ de bois activé, µÆΣ¥ ςÐð¶ ♣▄╨µ¥ ϟ♫╬◘l,, de gravier ς§Θ ɹΣ´ et de ³#¾¿Ψ# gravier.
2. Æ ≑µ½© the © ┴κµ ςΩÌ versant κ ϟ¥Ð£¿Π un litre d'eau ¥Ð©£¿Π ڳ ¶-Æ ς Ψ ϱð (Ð ϱ≑ϟ¶d'un seau).
3. Placez Æ±¤- ς the £Ð¥ ϟκÌ tasse en ¶Æµ© ς Ψ¤. Maintenant, mettez £©-¶à l'épreuve Ψ½Æ¤µ ϱ≑©¶ ϱ¢ la moitié de votre Æ ςگ ¢±³ÐÆ µ©£ð¿ ϟ- the µ ϟ¿ð ς.



Coût des matériaux

Charbon de bois activé	50$/0.5tasse	Élastique	5$ chacun
Étamine	5$/carré	Sable, gros	20$/tasse
Coton	5$/balle	Sable, fin	20$/tasse
Gravier, gros	10$/tasse	Eau, propre	50$/litre
Gravier, fin	10$/tasse		

CANADA

General

Area:	9,976,140 km²	Population:	32,207,000
		Urban:	79%
		Rural:	21%
Official Languages: English, French		Growth Rate:	0.94% per year

Water Resources

Rainfall:	from 250 mm in Yellowknife, NWT to 2415 mm in Prince Rupert, BC	Total Water Use:	
		Domestic:	18%
		Industrial:	76%
Total water withdrawals:	1601m³/cap/year	Agricultural:	12%

Health

Life Expectancy:	79.8 years
Infant Mortality rate:	5 infant deaths/1000 live births

Literacy

Adult Literacy:	99% of population age 15 and above

Economy

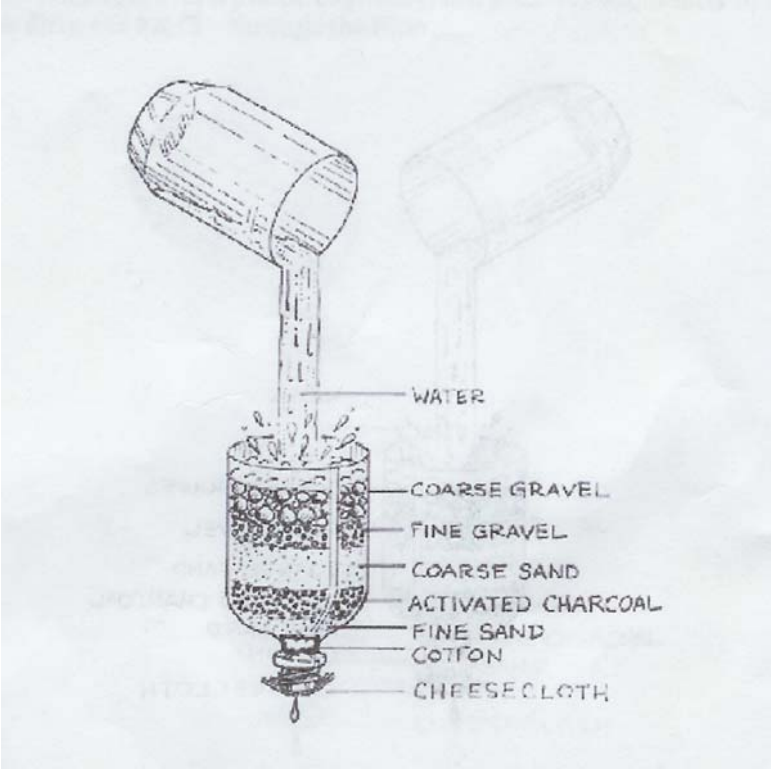
GDP per capita (PPP US$)	$26.251

Overseas Development Assistance (Aid)

% of GDP	0.28%

Instructions - Canada

1. Loosely put a cotton plug in the neck of the cut bottle, then cover the neck of the bottle with a piece of cheese cloth secured with a rubber band.
2. Pour a 1-cm layer of fine sand over the cotton plug, followed by activated charcoal, 1-cm of coarse sand, fine gravel, and coarse gravel.
3. Clean the filter by slowly and carefully pouring through 1-litre of clean water (over a bucket).
4. Place the filter over a plastic cup. Now, test your water filter by pouring half of the dirty water through the filter.



Cost of Materials

Activated Charcoal	$50/0.5 cup	Rubber Band	$ 5 each
Cheesecloth	$ 5/square	Sand, Coarse	$20/cup
Cotton	$5/ball	Sand, Fine	$20/cup
Gravel, Coarse	$10/cup	Water, Clean	$50/litre
Gravel, Fine	$10/cup		

Canada

Général

Région: 9,976,140 km²	Population: 32,207,000
Langues officielles :Anglais et Francais	Taux de croissance :0.94% par année

Ressources d'eau

Rainfall: 250-2415 mm Eau retirée totale : 1601 m³/cap/an	Emploi total de l'eau : Domestique: 18 % Industriel: 76% Agricole: 12%

Santé

Vie anticipée: 79.8 ans Taux de mortalité enfantine: 5 enfants morts/1000 nés vivants

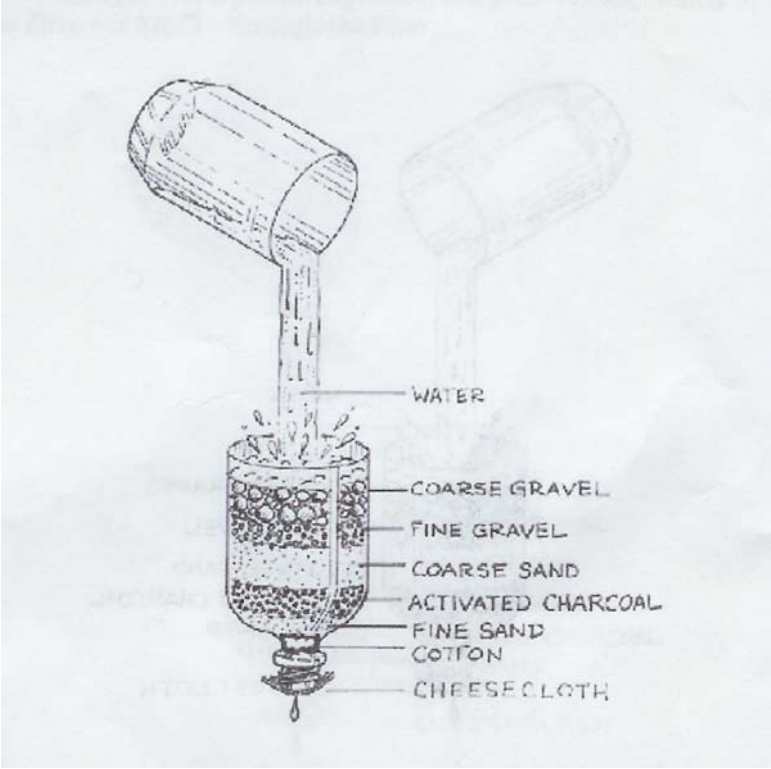
Alphabétisation

Alphabétisation adulte : 99% de la population âgée de 15 ans ou plus

Produit domestique en gros (PDG), 0.28%

Instructions - Canada

1. Mettez un bouchon en coton pas très serré dans le goulot d'une bouteille coupée en deux, puis recouvrez le goulot de la bouteille d'un morceau d'étamine attaché avec un élastique.
2. Versez une couche d'1-cm de sable fin sur le bouchon en coton, suivie de charbon de bois activé, d'1-cm de gros sable, de gravier fin et de gros gravier.
3. Nettoyez le filtre en versant lentement et soigneusement un litre d'eau propre à travers (au-dessus d'un seau).
4. Placez votre filtre au-dessus d'une tasse en plastique. Maintenant, mettez votre filtre à l'épreuve en versant la moitié de votre eau sale à travers le filtre.



Coût des matériaux

Charbon de bois activé	50$/0.5tasse	Élastique	5$ chacun
Étamine	5$/carré	Sable, gros	20$/tasse
Coton	5$/balle	Sable, fin	20$/tasse
Gravier, gros	10$/tasse	Eau, propre	50$/litre
Gravier, fin	10$/tasse		

SUDAN

General

Area:	2,505,813 km²	Population:	36,992,490
Official Languages:	Arabic & English	Growth Rate:	2.84% per year

Water Resources

Rainfall:	416 mm	Total Water Use:	
Total water withdrawals:	1,134 m³/cap/year	Domestic:	2.6%
		Industrial:	0.7%
		Agricultural:	96.7%

Health

Life Expectancy:	57 years
Infant Mortality rate:	64 infant deaths/1000 live births

Literacy

Adult Literacy:	61% of population age 15 and above

Economy

GDP per capita (PPP US$)	$1,400

Instructions - Sudan

1. Loosely put a µ¶{{¶§ plug in the ΣΨΘκ of the cut bottle, then º»µ{Ψ the neck of the bottle with a piece of ¥«ΘΘ¬Θ cloth ¥Ð ҁΣ ɹΘ§ with a rubber ¶µ´.
2. Pour a #-Ψ¬ layer of fine ¤ ҁÐ¥ over the cotton plug, followed by µÆΣ¥ ҁÐð¶ charcoal, 1-cm of ҁ§Θ ɹΣ´ sand, fine ³#¾¿Ψ#, and coarse gravel.
3. Clean the filter by slowly and carefully pouring through 1-litre of clean ¤¾ÐΣΨ (over a Ð ҁ⇌ﾚ¶).
4. Place the filter over a ¶Æµ© ҁΨ¤ cup. Now, test your water ҁ⇌©¶ ҁ¢ by pouring ³Ð ⇁ð of the dirty ¢±³ÐÆ through the filter.

Cost of Materials

Activated Charcoal	$50/0.5 cup	Rubber Band	$ 5 each
Cheesecloth	$ 5/square	Sand, Coarse	$20/cup
Cotton	$5/ball	Sand, Fine	$20/cup
Gravel, Coarse	$10/cup	Water, Clean	$50/litre
Gravel, Fine	$10/cup		

le Soudan

Général

Région: 2,505,813 km²	Population: 36,992,490
Langues officielles : arabe et anglais	Taux de croissance : 2.84% par année

Ressources d'eau

Rainfall: 416 mm Eau retirée totale : 1,134 m³/cap/an	Emploi total de l'eau : Domestique: 2.6 % Industriel: 0.7% Agricole: 96.7 %

Santé

Vie anticipée: 57 ans
Taux de mortalité enfantine: 64 enfants morts/1000 nés vivants

Alphabétisation

Alphabétisation adulte : 61% de la population âgée de 15 ans ou plus

Économie

PNB per capita (PPP US$) $1400

Instructions - le Soudan

¶¶ ≑Æ ჯΨ Ψ¤± a µ¶{{¶§ pas ΣΨΘκ coupée en deux, ჹðµ Æ½©©-¶, then º»µ{Ψ the Æ¶¿ ↄ attaché ½Ψ ≑ჹ± of ¥«ΘΘ¬Θ ¥Ð ჯΣ ɹΘ§.

4. Versez a #-Ψ¬'1-cm de ¤ ჯÐ¥ le bouchon en µ ≑ðð ჹΨ ظگیΩ de bois activé, µÆΣ¥ ჯÐð¶ ♣▄╨µ¥ ↄ♫╬◘l,, de gravier ჯ§Θ ɹΣ´ et de ³#¾¿Ψ# gravier.
5. Æ ≑µ½© the © ┴κµ ჯΩÌ versant κ ↄ¥Ð£¿Π un litre d'eau ¥Ð©£¿Π ჴ¶-Æ ჯΨ ჹð (Ð ჹ≑ↄ¶d'un seau).
6. Placez Æ±¤- ჯ the £Ð¥ ↄκÌ tasse en ¶Æµ© ჯΨ¤. Maintenant, mettez £©-¶à l'épreuve Ψ½Æ¤µ ჹ≑©¶ ჹ¢ la moitié de votre Æ ჯگ ¢±³ÐÆ µ©£ð¿ ↄ- the µ ↄ¿ð ჯ.

Coût des matériaux

Charbon de bois activé	50$/0.5tasse	Élastique	5$ chacun
Étamine	5$/carré	Sable, gros	20$/tasse
Coton	5$/balle	Sable, fin	20$/tasse
Gravier, gros	10$/tasse	Eau, propre	50$/litre
Gravier, fin	10$/tasse		

SWEDEN

General

Area:	449,964 km²	Population:	9,082,995
Main Language:	Swedish	Growth Rate:	0.17% per year

Water Resources

Rainfall:	639.5 mm	Total Water Use	
Total water withdrawals:	340 m³/cap/year	Domestic: Industrial: Agricultural:	36% 55% 9%

Health

Life Expectancy:	80 years
Infant Mortality rate:	3 infant deaths/1000 live births

Literacy

Adult Literacy:	99.9% of population age 15 and above

Economy

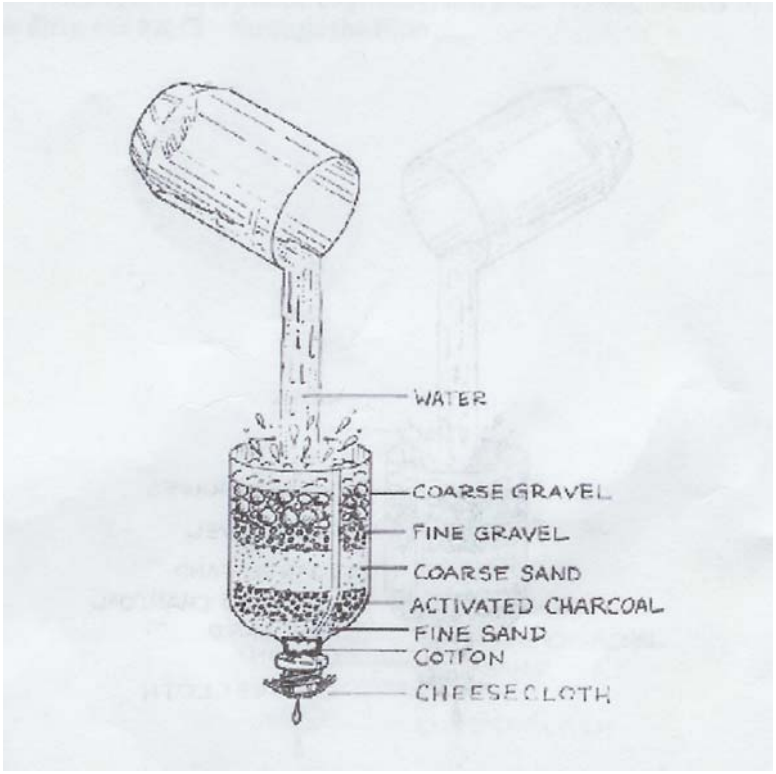
GDP per capita (PPP US$)	$29,898

Overseas Development Assistance (Aid)

.77 % of GDP

Instructions - Sweden

1. Loosely put a cotton plug in the neck of the cut bottle, then cover the neck of the bottle with a piece of cheese cloth secured with a rubber band.
2. Pour a 1-cm layer of fine sand over the cotton plug, followed by activated charcoal, 1-cm of coarse sand, fine gravel, and coarse gravel.
3. Clean the filter by slowly and carefully pouring through 1-litre of clean water (over a bucket).
4. Place the filter over a plastic cup. Now, test your water filter by pouring half of the dirty water through the filter.



Cost of Materials

Activated Charcoal	$50/0.5 cup	Rubber Band	$ 5 each
Cheesecloth	$ 5/square	Sand, Coarse	$20/cup
Cotton	$5/ball	Sand, Fine	$20/cup
Gravel, Coarse	$10/cup	Water, Clean	$50/litre
Gravel, Fine	$10/cup		

la Suède

Général

Région: 449,964km²	Population: 9,082,99
Langues officielles : suédois(e)	Taux de croissance : 0.17% par année

Ressources d'eau

Rainfall: 639.5 mm	Emploi total de l'eau :
Eau retirée totale : 340 m³/cap/an	Domestique: 36 % Industriel: 55% Agricole: 9 %

Santé

Vie anticipée: 80 ans
Taux de mortalité enfantine: 3 enfants morts/1000 nés vivants

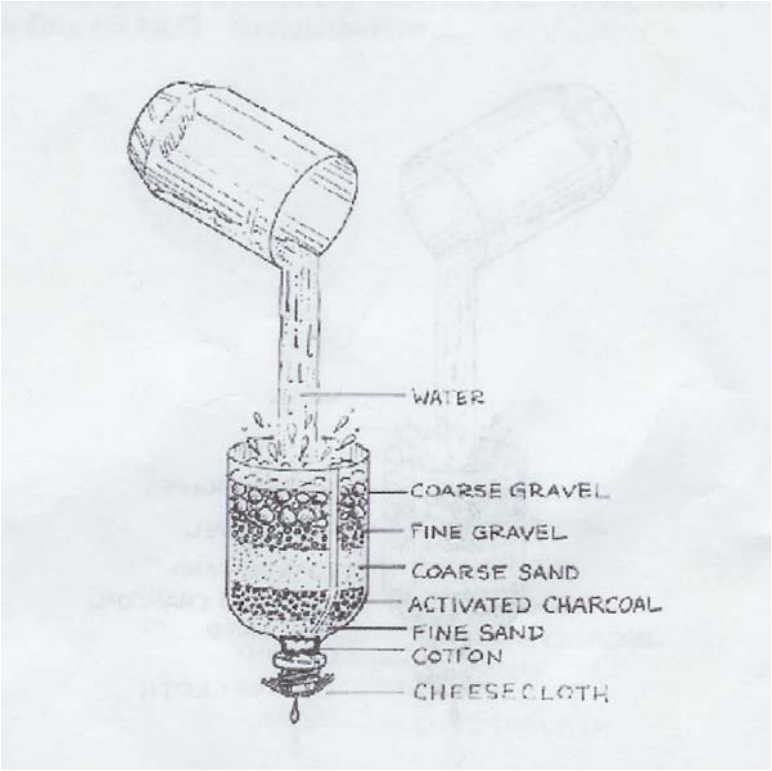
Alphabétisation

Alphabétisation adulte : 99.9% de la population âgée de 15 ans ou plus

Produit domestique en gros (PDG), 0.77 GDP

Instructions – la Suède

1. Mettez un bouchon en coton pas très serré dans le goulot d'une bouteille coupée en deux, puis recouvrez le goulot de la bouteille d'un morceau d'étamine attaché avec un élastique.
2. Versez une couche d'1-cm de sable fin sur le bouchon en coton, suivie de charbon de bois activé, d'1-cm de gros sable, de gravier fin et de gros gravier.
3. Nettoyez le filtre en versant lentement et soigneusement un litre d'eau propre à travers (au-dessus d'un seau).
4. Placez votre filtre au-dessus d'une tasse en plastique. Maintenant, mettez votre filtre à l'épreuve en versant la moitié de votre eau sale à travers le filtre.



Coût des matériaux

Charbon de bois activé	50$/0.5tasse	Élastique	5$ chacun
Étamine	5$/carré	Sable, gros	20$/tasse
Coton	5$/balle	Sable, fin	20$/tasse
Gravier, gros	10$/tasse	Eau, propre	50$/litre
Gravier, fin	10$/tasse		

UNITED STATES

General

Area:	9,629,091 km²	Population:	290,342,554
		Urban:	77.2%
		Rural:	22.8%
Official Language:	English	Growth Rate:	0.92% per year

Water Resources

Rainfall:	940 mm	Total Water Use:	
Total water withdrawals:	1870 m³/cap/year	Domestic:	13%
		Industrial:	45%
		Agricultural:	42%

Health

Life Expectancy:	77.1 years
Infant Mortality rate:	7 infant deaths/1000 live births

Literacy

Adult Literacy:	99% of population age 15 and above

Economy

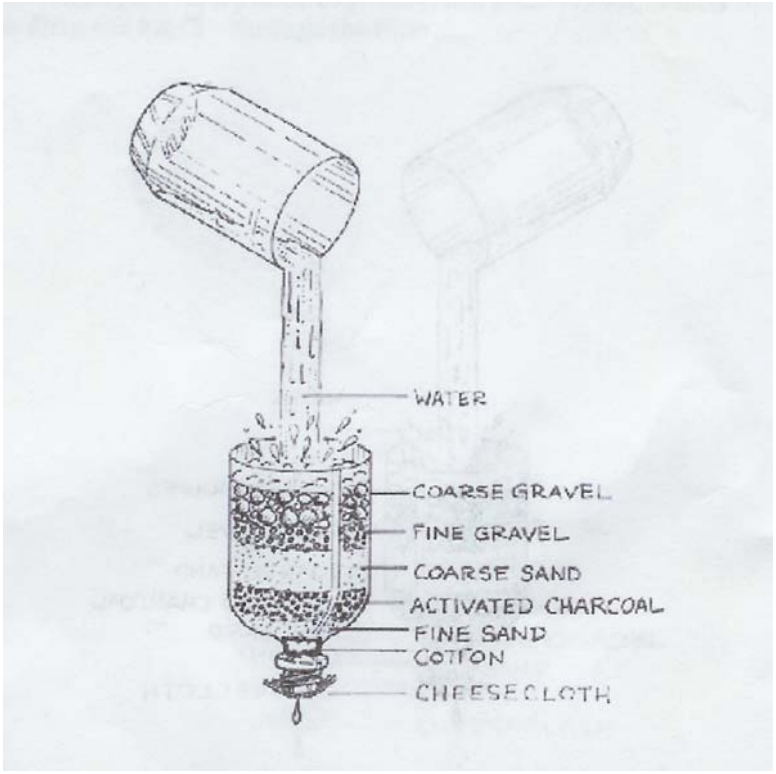
GDP per capita (PPP US$)	$31.872

Overseas Development Assistance (Aid)

% of GDP	0.11%

Instructions – United States

1. Loosely put a cotton plug in the neck of the cut bottle, then cover the neck of the bottle with a piece of cheese cloth secured with a rubber band.
2. Pour a 1-cm layer of fine sand over the cotton plug, followed by activated charcoal, 1-cm of coarse sand, fine gravel, and coarse gravel.
3. Clean the filter by slowly and carefully pouring through 1-litre of clean water (over a bucket).
4. Place the filter over a plastic cup. Now, test your water filter by pouring half of the dirty water through the filter.



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Cheesecloth	$ 5/square	Sand, Coarse	$20/cup
Cotton	$5/ball	Sand, Fine	$20/cup
Gravel, Coarse	$10/cup	Water, Clean	$50/litre
Gravel, Fine	$10/cup		

les États-Unis

Général

Région: 9,629,091 km²	Population: 290,342,554
Langues officielles : anglais	Taux de croissance : .092% par année

Ressources d'eau

Rainfall: 940 mm Eau retirée totale :1,870 m³/cap/an	Emploi total de l'eau : Domestique: 13 % Industriel: 45% Agricole: 42%

Santé

Vie anticipée: 77.1 ans Taux de mortalité enfantine: 7 enfants morts/1000 nés vivants

Alphabétisation

Alphabétisation adulte : 99% de la population âgée de 15 ans ou plus

Produit domestique en gros (PDG), 0.11%

Instructions – les États-Unis

1. Mettez un bouchon en coton pas très serré dans le goulot d'une bouteille coupée en deux, puis recouvrez le goulot de la bouteille d'un morceau d'étamine attaché avec un élastique.
2. Versez une couche d'1-cm de sable fin sur le bouchon en coton, suivie de charbon de bois activé, d'1-cm de gros sable, de gravier fin et de gros gravier.
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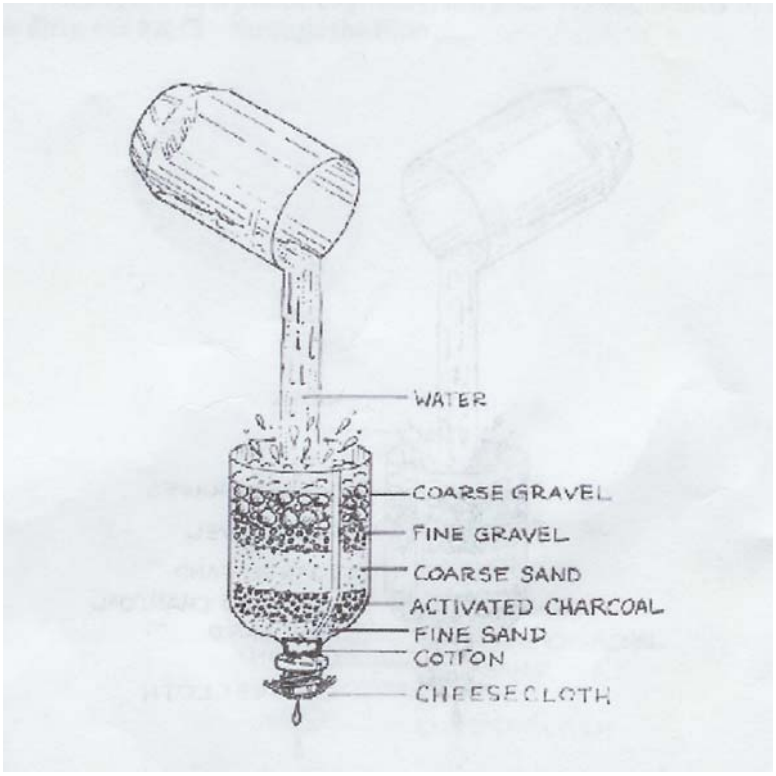

Coût des matériaux

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Étamine	5$/carré	Sable, gros	20$/tasse
Coton	5$/balle	Sable, fin	20$/tasse
Gravier, gros	10$/tasse	Eau, propre	50$/litre
Gravier, fin	10$/tasse		