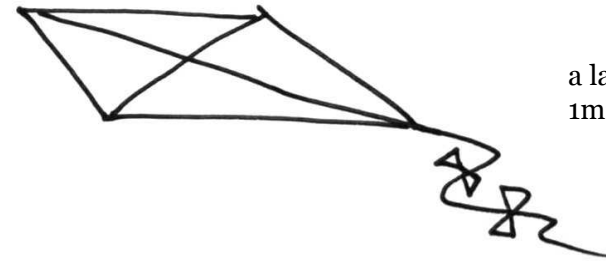
An Illustrated Guide to

Grassroots Mapping with Balloons and Kites

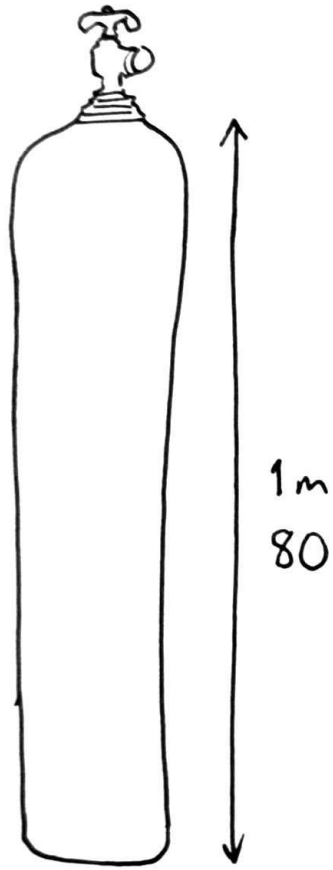
To learn more, visit http://grassrootsmapping.org

Do you want to make maps? Do you need satellite images but can't afford them? Do you want to see your home from above?

Follow these instructions and you can, for as little as $100!

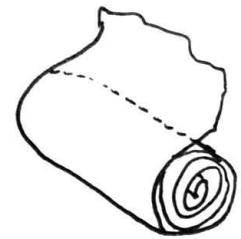


a large kite - 1m² or more



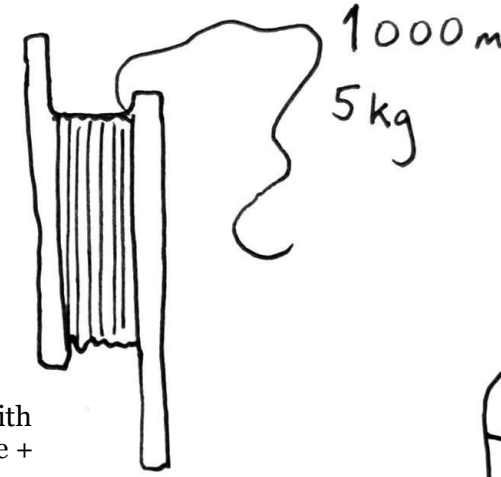
80 cubic feet or 1.5 cu. meters of helium

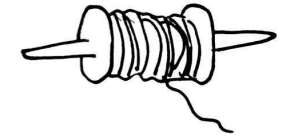
One 2 meter-wide weather balloon



or 2 mylar sleeping bags

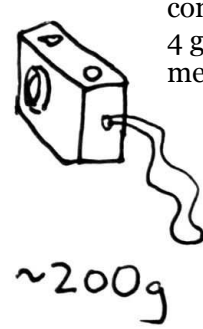
1000m nylon string for balloons



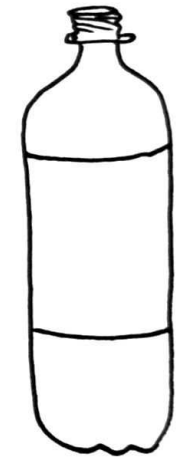


30kg+ strength nylon string for kites

digital camera with continuous mode + 4 gb or larger memory

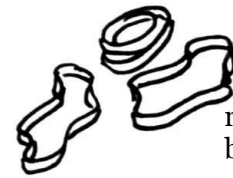


heavy work gloves

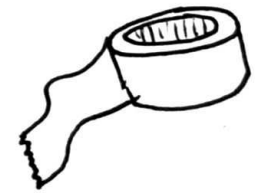


plastic soda bottle

scissors



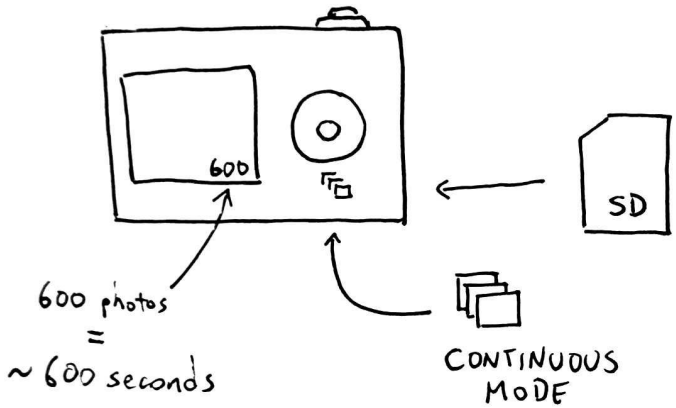
rubber bands



duct tape, gaffe tape is best

Choose and prepare your camera

Any digital camera around 2-300 grams that has a 'continuous mode' can work. You can also use a Canon camera with the CHDK to trigger a photo every 5 seconds.

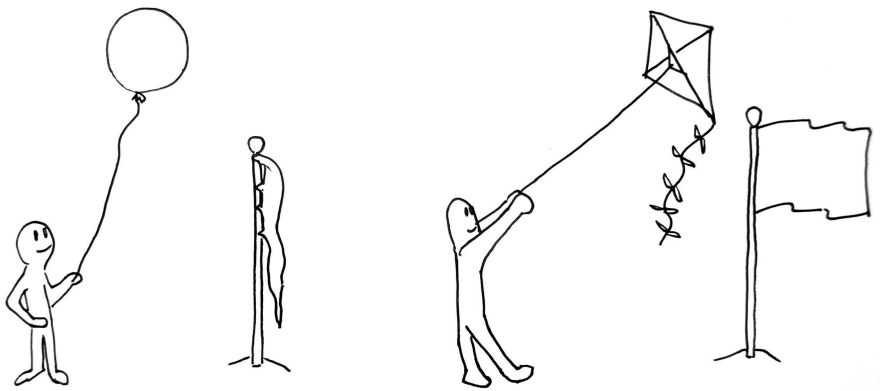


In 'Continuous Mode' a camera takes a picture every 1 second if the trigger is held down. Your display will show how many pictures you can take on your card.

To fly longer, you may need a newer battery, a larger memory card, or you can set your camera to a lower resolution. A 4 GB card fills up in about 35 minutes.

Balloons or kites?

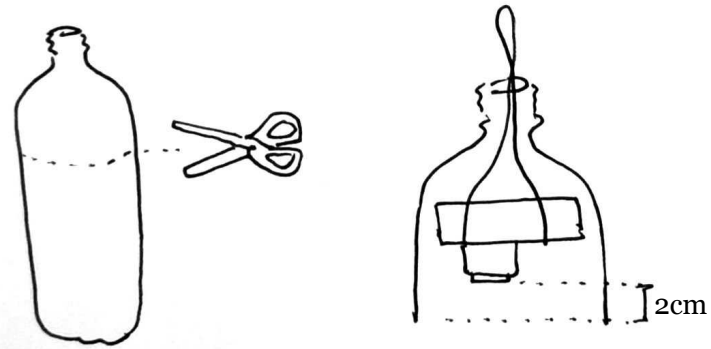
Decide whether to use a balloon or kite based on local wind conditions. While kites are cheaper, they're harder to fly, and you may have to prepare for both:



Balloons in <10kph wind; kites in more than that. Look at flags to decide.

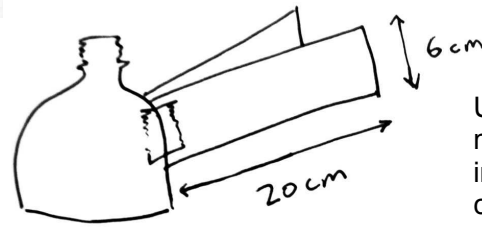
Build a camera capsule

This simple protective cover stops your lens from hitting the ground, and protects your camera from hitting walls and trees.

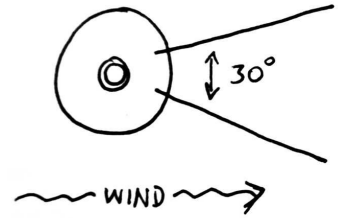


Cut a soda bottle in half and put the camera inside the top with the loop through the bottle neck.

Be sure the camera lens is protected even when it's extended!

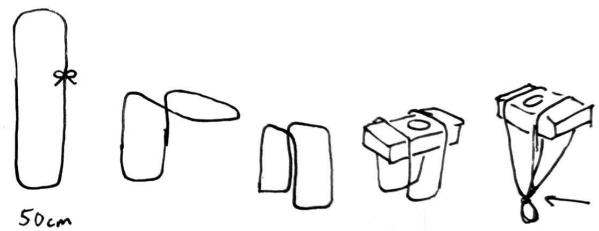


Use the rest of the bottle to make 'wings' to stabilize it in the wind. Cut strips and crease them to keep them straight.

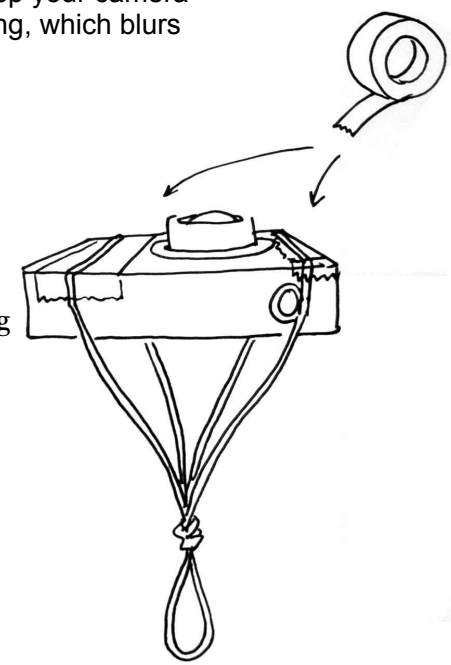


This will keep your camera from spinning, which blurs the photos.

Fold a 1 meter loop of string and tape it firmly onto your camera. Be sure the tape doesn't stop the lens from extending.



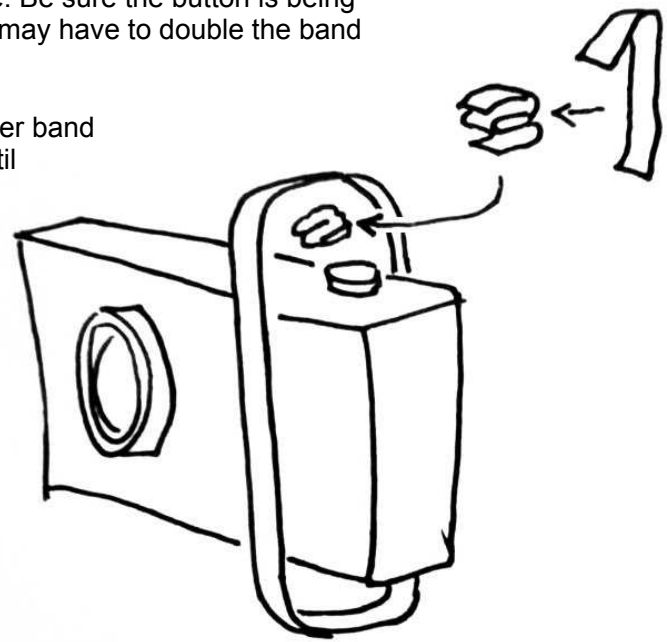
Press the tape down hard - its the only thing keeping your camera from slipping out of the string at 500 meters high!



Set up your camera to auto-trigger

Set your camera on continuous mode. Wad up a bit of card paper or use a pencil eraser to hold down the camera trigger. Use a rubber band to hold it in place and apply pressure. Be sure the button is being pressed - you may have to double the band up.

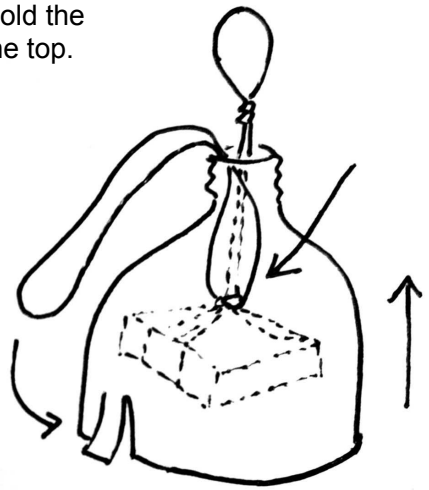
Move the rubber band to one side until you're ready to start.



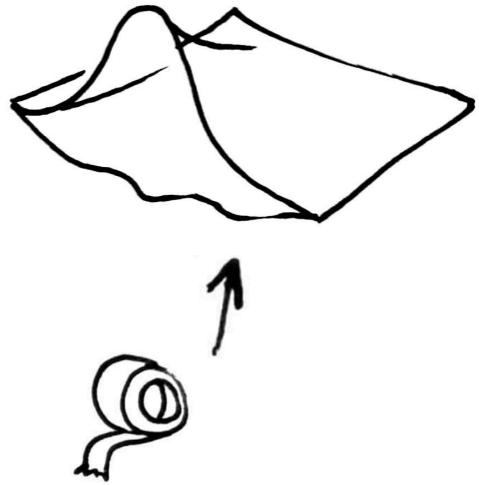
You can add a second loop or a rubber band and hook it on the bottom of the bottle to hold the camera firmly against the top.

Even better, put the cap on over the string when the camera is snugly in place, trapping the string.

Bounce the camera on a mattress and be sure it doesn't scrape the ground or fall out.



Prepare and fill your balloon

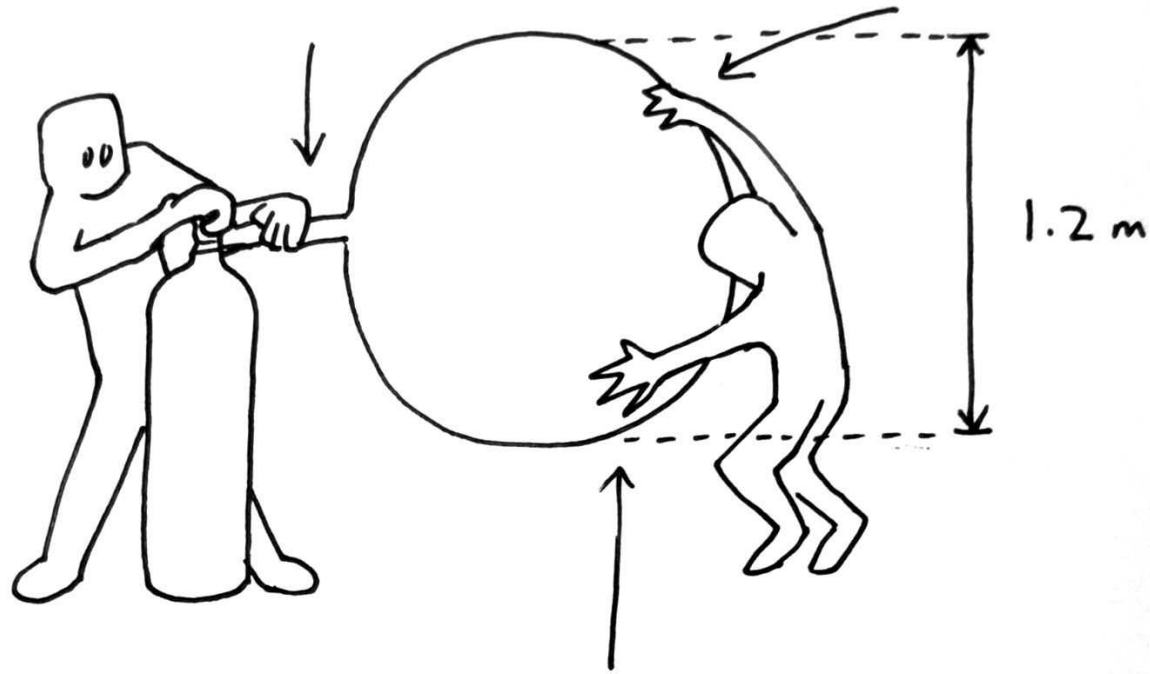


1.5 meter wide weather balloons work best, but if you can't get one, you can make one from plastic. You can use several giant trash bags, but they won't stay inflated for more than an hour -- mylar or PET plastic is far more airtight.

Where available, *mylar sleeping bags* can be taped shut and will stay filled for several days, unlike weather balloons. Two of these are enough to lift a typical camera.

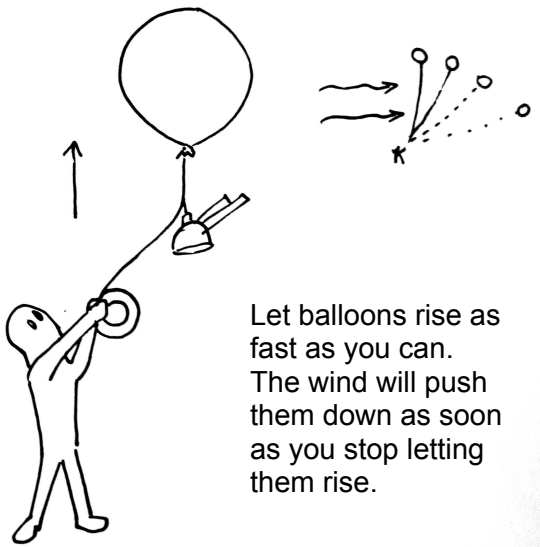
Test your valve first by letting some helium out with nothing attached. Then put your balloon on and slowly inflate it.

Someone should be in charge of not letting the balloon touch trees, bushes, or the ground.



Flying your balloon or kite

The highest wind is usually around 2pm, and the lowest is at dawn. Bring water and sunscreen if it's hot out, and charge your camera batteries the night before



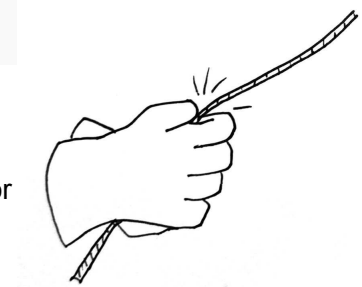
Let balloons rise as fast as you can. The wind will push them down as soon as you stop letting them rise.

Wind the string carefully - don't let it tangle! If it's bad enough you'll have to throw it out.

A second person just to wind the string can be very helpful.

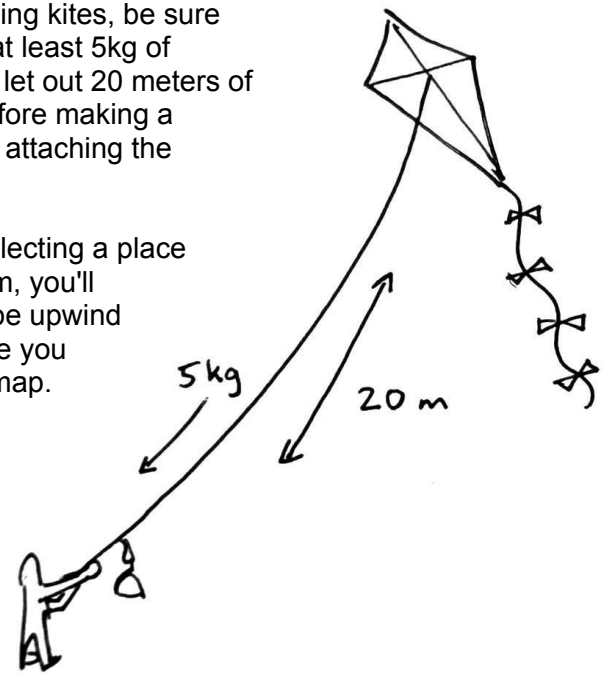
Always wear heavy gloves to prevent string burns!

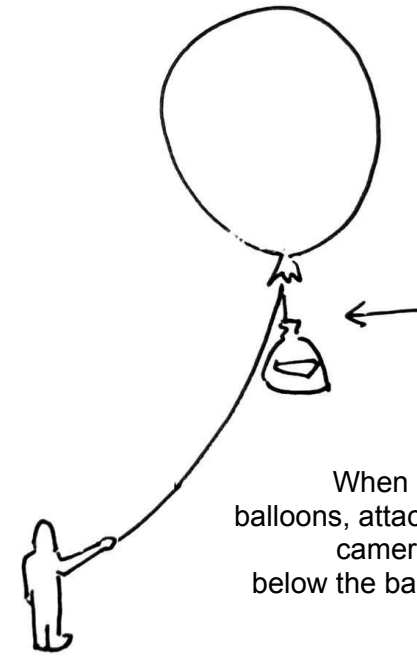
Don't fly near power lines or in thunderstorms.



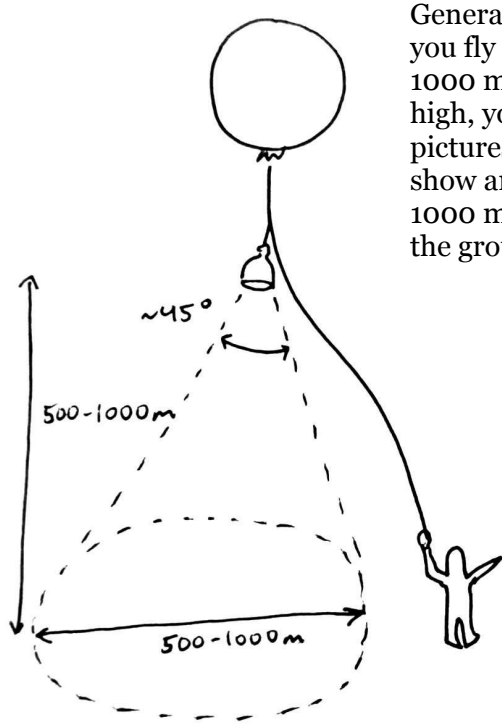
When using kites, be sure there is at least 5kg of pull, and let out 20 meters of string before making a loop and attaching the camera.

When selecting a place to fly from, you'll have to be upwind of the site you want to map.





When using balloons, attach the camera just below the balloon.



Generally, if you fly 1000 meters high, your pictures will show around 1000 meters on the ground.

Once the balloon is 500-1500 meters high, try walking around to take pictures of a greater area.

A small map usually takes around 2 hours to make.

Bring a GPS if you have one, and write down the latitude and longitude, or record a track.

Even a drawing of your site, or a photo of an existing map is helpful.