How to make good AC out of Bad AC in a Primitive Environment

Good AC (alternating current): This is nearly constant voltage pure sine wave 115 v plus or minus 5 volts at 60 Hz for northern America. For other countries that use 220V and/or 50 Hz. The same concepts apply. The numbers for the voltage and frequency ranges proportionally changes.

Bad AC: This is modified sine wave or square wave and/or voltage fulgurations greater than 122 volts and less than 105 volts. It is also bad when the frequency is more than 20% variance from 60 Hz. Bad AC can cause electronics, tungsten, and florescent lighting to burn out.

Gasoline generators also can make bad AC when out of the range of voltage or engine speed. This can happen with variation in load or power used. Keep a digital voltmeter on hand and measure the voltage regularly. Adjust engine speed accordingly to give more or less voltage. Square wave (modified sine wave) even if the correct voltage can cause problems with electronics (TV's, radios, etc), microwave ovens, and refrigerators (starting).

The short answer is don't even try to filter or clean up bad AC. Charge a battery with it and use only a pure sine inverter to convert back to good AC. Pure Sine Wave Inverters cost 2-3 times more than a modified sine inverter but it is worth it in the long run. Even if your load will run on modified sine inverter it will run more efficiently using less power on a pure sine inverter.

For wind and water power: Dumping the extra power into a dump-load of some sort can be an answer to too much power or over voltage. The load typically can be lighting or heating water. In a primitive environment it becomes a time when hot baths or showers are possible. If the change in voltage is slow then a variable auto transformer hand operated or servo motor operated can be used to adjust its level. This might be able to be used with water power.

Summary: For all types of power sources in a primitive environment don't even try to fix bad AC using some sort of filter. If you got bad AC that you can't control --- charge a battery and then use a pure sine inverter to convert back to good AC. Anything else will result in burned out non-working irreplaceable items (light bulbs, electronics, etc).