The Use of Used Tires in Water Systems

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Abstract

Old tires have many uses in the control of erosion, both in and out of water. They are pollution-insect free, good insulators, fire resistant when filled with soil and last an estimate of 250 years.

Keywords: tire, erosion control, pollution free, long lasting

Introduction

The United States has a vast number of used tires and they increase at roughly 300 million per year. Some are burned in smelters or ground up for surface covering. This process is handicapped by the high strength steel that is part of the tires. Burning introduces toxic materials into the air that are difficult to capture.

It seems more effective to use them in their original condition. They can be used for animal fences on farms, as subgrades or barriers for road construction, bullet stops on rifle ranges, off-shore for wave control and fishing. Wave barriers around lakes and fish habitat have proved to be successful. Other applications are construction of houses and water-erosion control.

Many studies have shown that whole tires do not present smell or pollution problems, are very long lasting in dry soil or fresh and salt water. When filled with soil or baled (to be discussed below) they are very resistant to fire, insect or noise penetration.

Erosion Applications

In the West rain falls in short and often intense storms. The area of the storm may be small but the rapid increase of the water and speed of the flow causes severe erosion. The question is "what can be used for erosion control?" Rock barriers are effective but require significant time to build, if stones are not available they must be trucked in.

Concrete has been used but it is expensive and some skill in concrete construction is required. The cost and requirement for hiring skilled help makes concrete impractical for many applications.

In contrast tires are generally free from the County involved and they are easier to haul than stones. In some cases the County will actually haul them to the construction site. The author has had some experience in tires for erosion control Figures 1 and 2 show a tire dam built some 5 years ago. It has performed very well, water is retained in the soil and grass can grow. The water passing the dam is free of soil particles and the rancher involved is quite happy with it.

The construction was aided by Mr. Joseph Minyard a graduate student and Pima County probationers. The first step was the removal loose soil in the arroyo; we went down until hardpan was reached. The first layer of tires was laid and pinned to the soil with 18-inch soil bolts. The tires were then filled with 1" stones and plastic ties were used to attach the next layer. (Plastic ties were specified by a state agency and they have stood up well to the intense sunlight.) Several figures show the tie and fastening process and the dam in cross-section (Figures 3, 4, and 5); the final dam was 5 tires high.

Results

The dam has stopped soil from eroding in the area; a nearby road that was blocked by loose sand after every storm is now always passable. The soil level above the dam has risen and there is grass where there was nothing but bare sand.

Comments

The use of baled tires is now quite common; 100 passenger car tires are used. A photo of the baling process is shown in Figure 6. The bales are 4.5 x 5.5 x 2.5 feet; they weigh some 2,000 lbs. and must handled

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by front loader or small crane. The bales are tied together by steel wire put in during the baling process, it is interesting to note that after a year in baled condition the wires can be removed and the tires stay in place. Chain can be inserted to fasten the bales together producing very strong walls.

Small bales have been made for special purposes, they can be placed at the center of a gabion and then surrounded by stones. The system is much lighter than a gabion filled with stones.

The application of bales for banks and breakwaters at lakes is shown in Figure 7. The nice thing about bales is they are fast to use provided you have power machinery. If the bales are unsightly they can be covered by adobe.

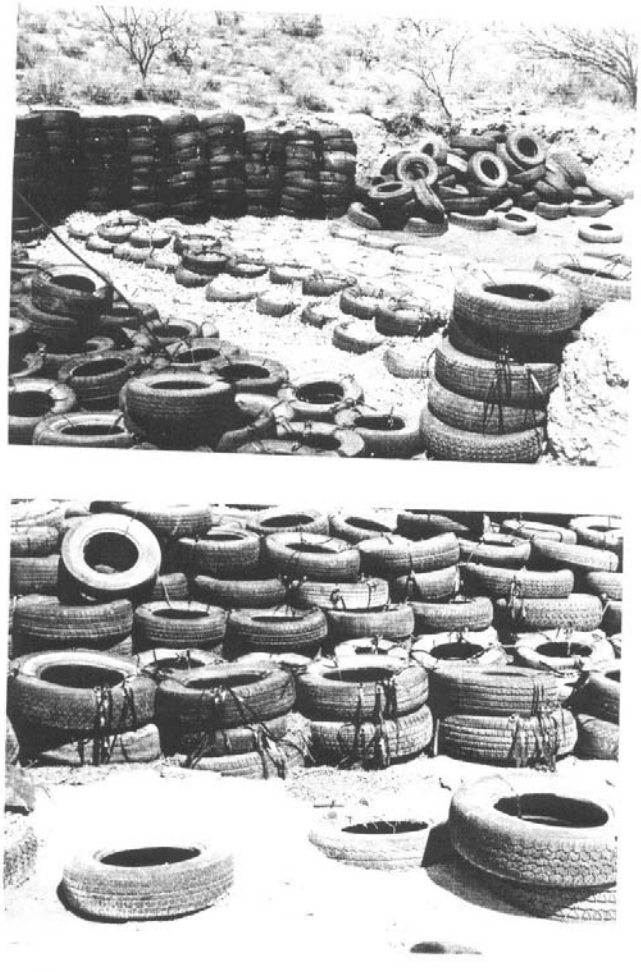

Figure 1. Erosion control dam under construction.

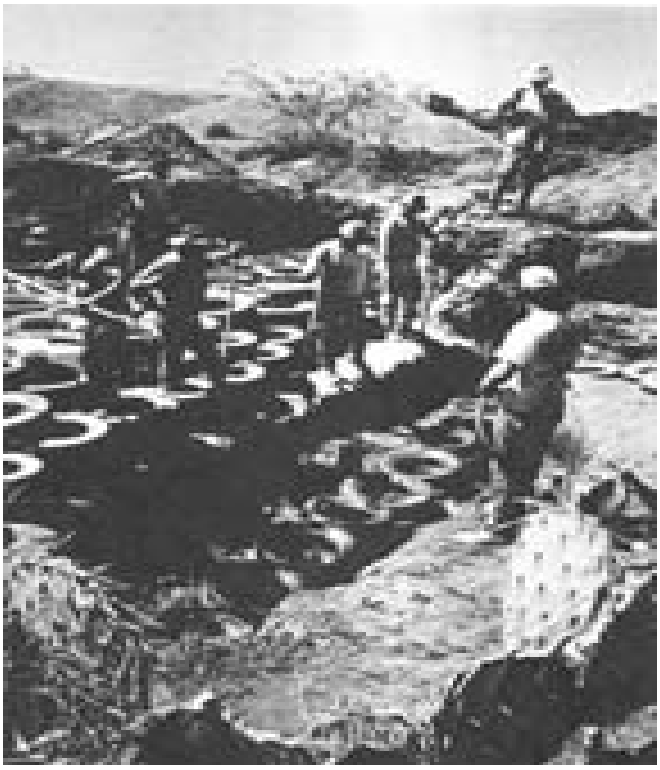

Figure 2. Dam under construction

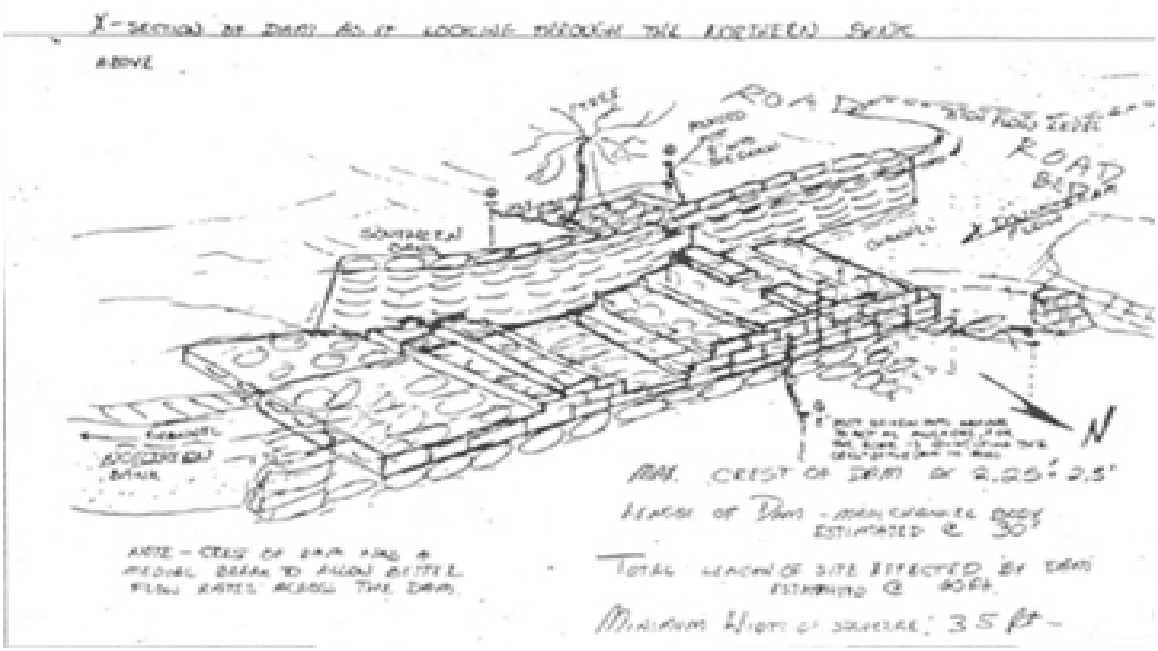

Figure 3. Three-dimensional view of dam.

Figure 4. Dam six months after construction; the soil is now five tires high.

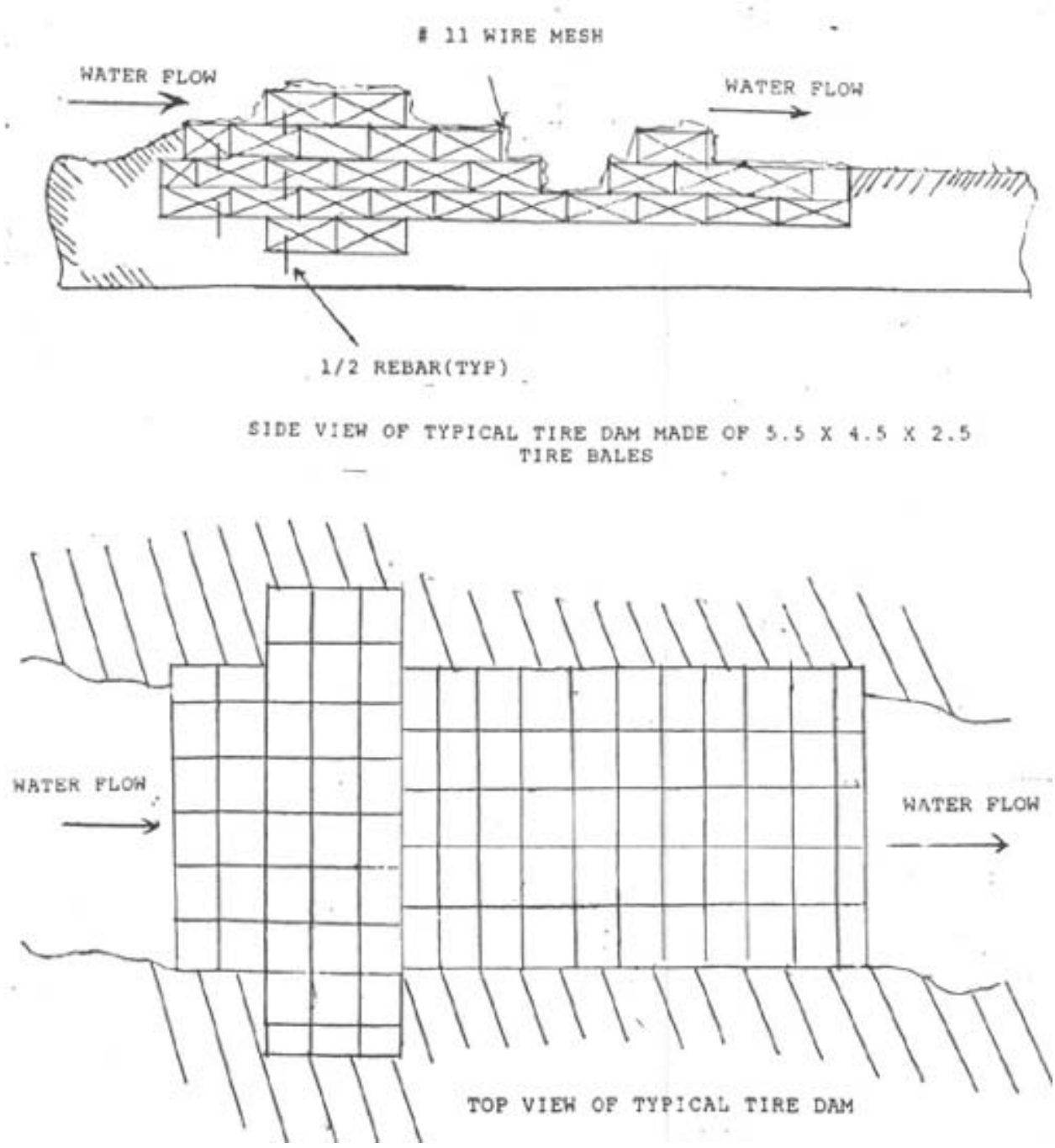

Figure 5. Dam (using bales) shown in side and top views.

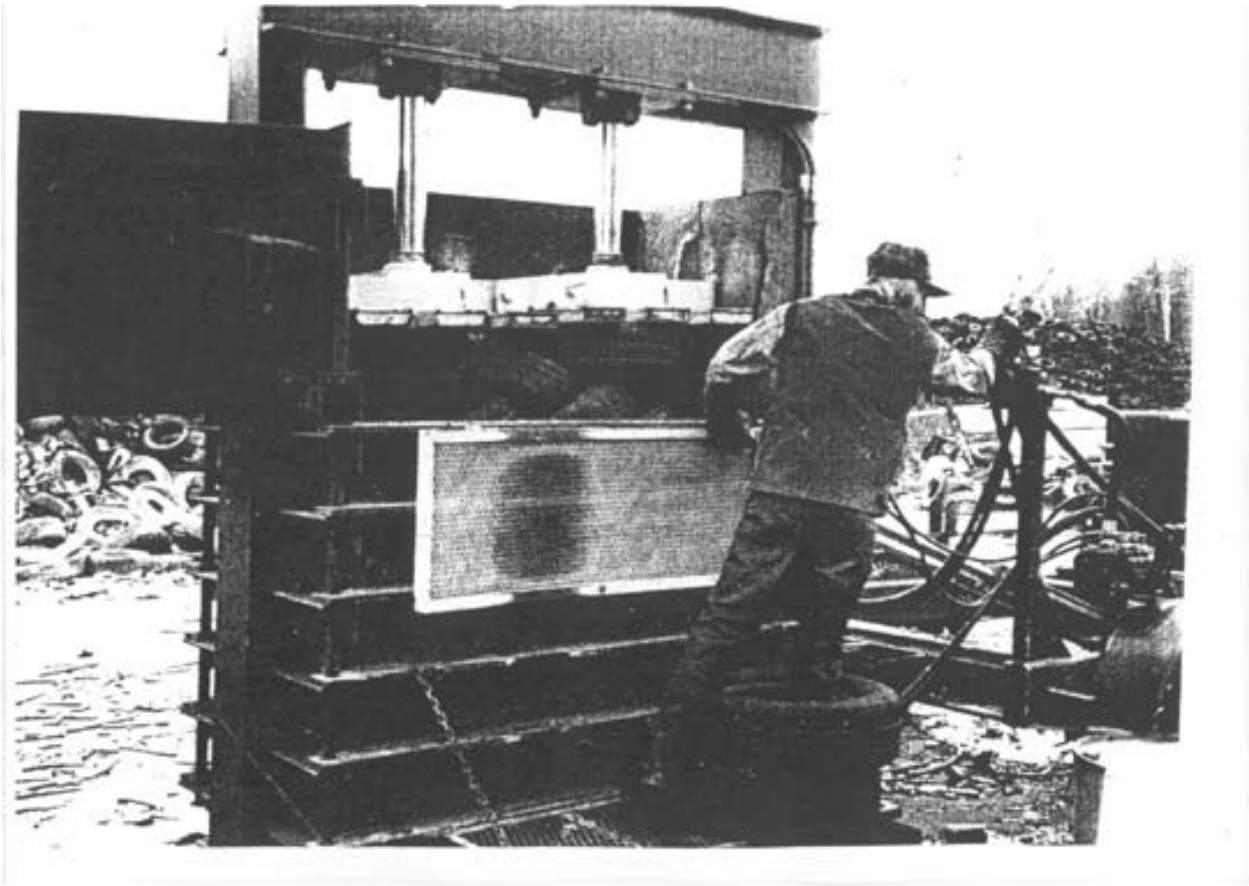

Figure 6. The tire baling process.

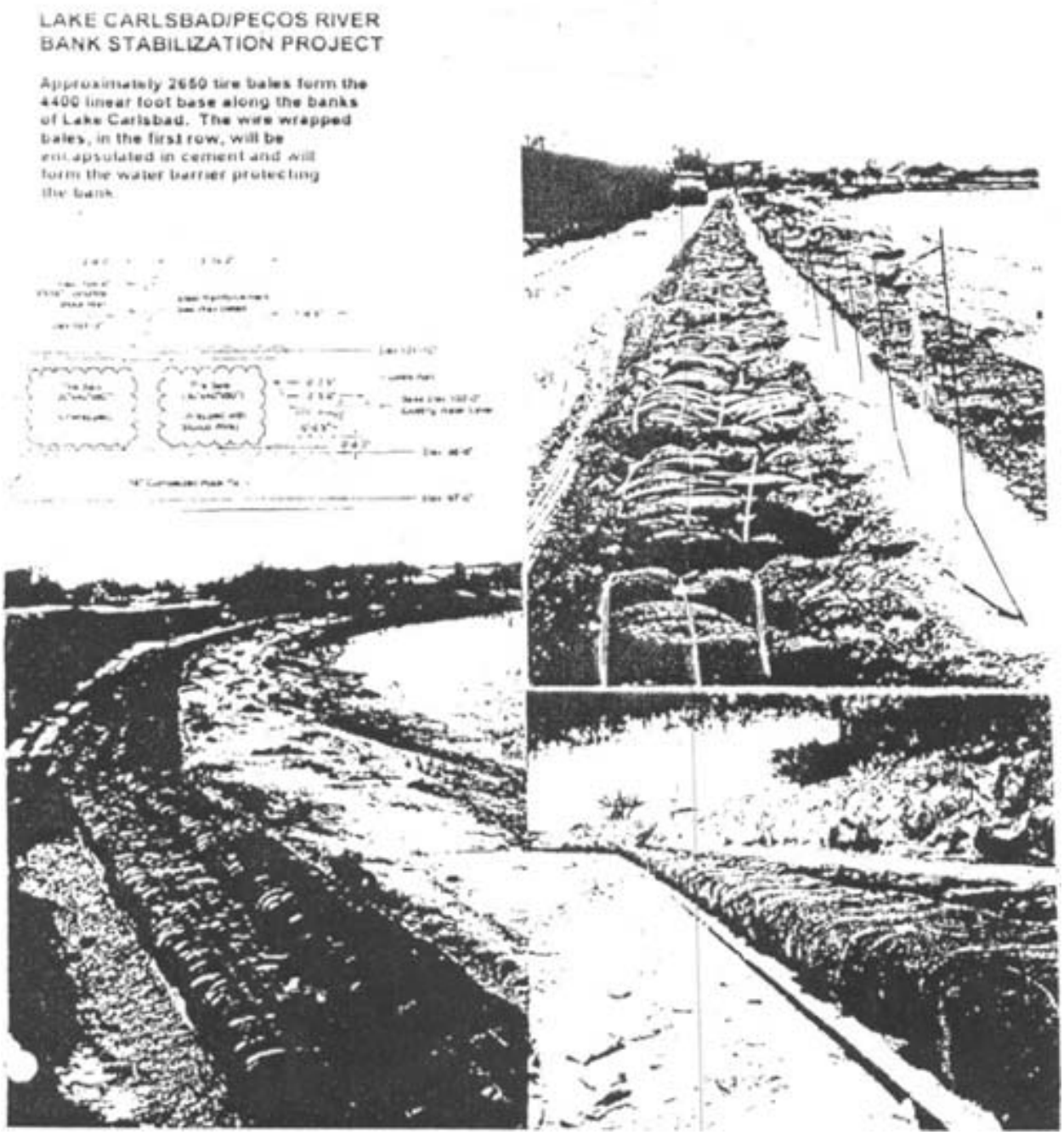

Figure 7. Application of bales along the shore of a lake