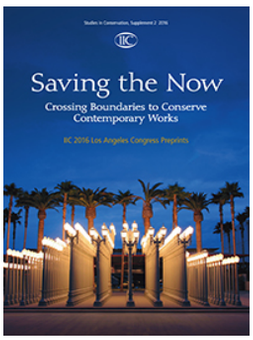

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Core concepts in disaster preparedness, response, and recovery for inkjet-printed photographs and fine art

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Introduction

Large numbers of inkjet prints are already in collections. Unfortunately, many are considerably more sensitive to water damage than traditional prints, and some may even harm adjacent materials during water emergencies. Existing research suggests that inkjet prints immersed in water are prone to bleed, cracking, delamination, blocking, etc. Each damage type is highly dependent on the colorants used as well as the chemical and physical nature of the papers. While preliminary work has ranked the sensitivities of various inkjet types and evaluated potential methods for drying, a full understanding of how the materials will behave from small spills to prolonged immersions, in dirty or salt waters, as well as during exposure to extreme relative humidities, has yet to be performed (Burge & Scott, 2010; Jürgens & Schempp, 2010). Research at IPI over the last three years on the effects of water exposure and techniques for recovery has led to the following core concepts for the salvage of inkjet prints during water emergencies.

Concept 1: Inkjet prints are not a homogeneous group of materials that exhibit similar responses to water exposure

Many inkjet prints, especially early examples, are severely damaged immediately on contact with water; however, newer examples often last hours or days with only minor cockling as an outcome. This is because, over the last three decades, the colorants used in inks evolved from soluble dyes to insoluble pigments. It should be noted that some pigment prints can still bleed in water, though the severity will be less. Additionally, the paper type can have a mitigating effect on the rate of bleed. Porous type papers display slower rates of bleed over uncoated or polymer-coated papers making recovery more likely if response is quick enough. Some papers themselves are sensitive whether printed with dye or pigment inks, as the surface coatings can dissolve or delaminate or show severe crazing after drying. The following chart can be used for recovery prioritization, though decisions on which objects to save first will have to be integrated with recovery prioritization for all collection object types (Table 1).

Concept 2: Inkjet prints do not behave like traditional photographs when exposed to water

The rule of thumb that photographs can remain submerged up to 48 hours does not apply to inkjet prints, because inkjet damage continually increases from first water contact onward whether slow or fast. The sooner inkjet printing removed from water and dried, the better the chance for recovery (Fig. 1).

Concept 3: Inkjet prints should be accurately cataloged, and stored in sleeves or boxes

Preparation involves good record keeping, thoughtful storage, proper enclosures, and a solid disaster plan. To prepare, staff must accurately catalog print types. Prints should be stored in locations with low chance of water contact, including high shelves and upper floors. Housing in appropriate sleeves and sturdy boxes can buy precious time over storage loose, or paper interleaving. Warning labels on boxes with objects especially sensitive to damage can also provide guidance to those dealing with the chaos of an actual emergency, guiding them to materials that need the most rapid response.

Concept 4: Inkjet prints should be removed from water as quickly as possible, separated from enclosures, and then air-dried individually and horizontally

Prints exposed to dirty water should be rinsed to remove particles of debris, but extended rinsing

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Table 1 Prioritization schedule for inkjet print recovery during water emergencies

Destroyed instantly	Respond ASAP	Retrieve last
Dye on uncoated fine art paper	Dye on porous-coated RC	Pigment on uncoated fine art paper
Dye on porous-coated fine art paper	Pigment on porous-coated RC	
Dye on polymer-coated RC	Pigment on porous-coated fine art	
Dye on porous-coated baryta	Pigment on porous-coated baryta	

during recovery will not diminish paper staining significantly. Cleaning efforts should be postponed until all prints have been removed from the flooded environment. Those exposed to salt water should be rinsed to reduce salt content, but prolonged rinsing may exacerbate bleed and other forms of damage.

Prints must be immediately separated from stacks and removed from enclosures to prevent bonding or continued colorant bleed. They should never be dried stacked, either directly or interleaved, but individually and horizontally.

Most individual prints will air dry within 48 hours but photobooks or artist books may take much longer. Freeze-drying may be the best way to minimize wet time, and prevent further damage, though more research is needed to establish its safety (Jürgens & Schempp, 2010).

Concept 5: Beware of high humidity in the flooded areas and locations where prints may be laid out to dry

During an emergency, focus will likely be on items that are wet or submerged, but dry items above the water line may be exposed to conditions of high relative humidity (RH) that can also cause damage. The RH of areas being used for drying should also be monitored to avoid conditions that can induce further bleed of inks, blocking, or mold. Low humidity speeds drying while high humidity extends drying times. Any treatment that prolongs the time a print is wet increases the likelihood of damage.

Conclusions

Inkjet prints are a diverse group of materials with dramatic variations in water sensitivities, and damage may be instantaneous, or may occur slowly over days. Proper education and training followed by thoughtful preparations and response rehearsal are the most effective strategies to surviving water emergencies for these collections. For these reasons a full disaster plan should already be in place.

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Figure 1 Color photograph and two inkjet prints after 48 hours immersion.

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